

## ◆Vaccines:-

### ■BVD:-

#### 1- Pneumo 3:

- Name: pneumo-3
- Dose: 5ml → 2 wks. → 5ml
- Type: Killed
- Booster dose: After 6 months "5ml only"
- Route: I/M
- Protect against: BVD – IBR & PI<sub>3</sub>
- Age: at 2 months of age "If calf takes colostrum → at 6 months of age"  
"Pregnant ♀ vaccinated 2 – 4 wks. Prior parturition"
- Advantages: Safe, doesn't cause abortion, doesn't shed M.O & No immune-suppression
- Disadvantages: Activates only humeral immunity & Causes anaphylactic shock

#### 2- Pneumo-4:

- Name: Virashield or Bovishield
- Dose: 5ml → 2 wks. → 5ml
- Type: Killed
- Booster dose: After one year "5 ml only"
- Route: I/M
- Protect against: BVD – IBR – BRSv. & PI<sub>3</sub>
- Age: at 2 month of age "If calf takes colostrum → at 6 months of age"  
"Pregnant ♀ vaccinated 2 – 4 wks. Prior parturition"

#### 3- Pneumo-5:

- Protect against: BVD<sub>1</sub> – BVD<sub>2</sub> – IBR – BRSv. & PI<sub>3</sub>
- Dose: 5ml → 2 wks. → 5ml
- Type: Killed
- Booster dose: After one year "5 ml only"
- Route: I/M
- Age: at 2 month of age "If calf takes colostrum → at 6 months of age"  
"Pregnant ♀ vaccinated 2 – 4 wks. Prior parturition"

#### 4- Cattle master:

- Name: Cattle master
- Dose: 2ml → 2 – 3 wks. → 2ml
- Type: Live attenuated
- Booster dose: After one year
- Route: I/M

• Protect against: BVD "Killed" – IBR – BRSv. & PI<sub>3</sub>

• Age: at 1 months of age "If calf takes colostrum → at 6 months of age"

"Pregnant ♀ vaccinated 2 – 4 wks. Prior parturition"

• Advantages: - Doesn't cause anaphylactic shock  
- Long protection - Activates humeral & cellular immunity

• Disadvantages: - Causes abortion - Sheds M.O - Immune-suppressive  
- Causing signs & symptoms

### ■ IBR:-

| Items                | MLV (I/M)                                                                              | MLV (I/N)                                                                                        |
|----------------------|----------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------|
| <b>Advantages</b>    | 1- Easy to be used<br>2- Used for all ages<br>3- Could be combined with other vaccines | 1-Safe for pregnant ♀<br>2-Doesn't cause latent infection<br>3- Doesn't cause immune-suppression |
| <b>Disadvantages</b> | 1-May cause abortion<br>2-May cause latent infection<br>3-May cause immune-suppression | —                                                                                                |

| Items                 | Advantages                                                                                                                 | Disadvantages                                            |
|-----------------------|----------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------|
| <b>Killed Vaccine</b> | 1- More safe<br>2- Doesn't cause post-vaccinal reaction<br>3- Doesn't cause abortion<br>4- Doesn't cause shedding of Virus | 1- May cause anaphylaxis<br>2- May cause fatal urticaria |

▲ مع تحصينات الـ BVD

### ■ FMD:-

1-  $O_1 + A_{22}$ : "Bivalent inactivated vaccine"

2-  $O_1 + A_{22} + SAT_2$ : "Trivalent inactivated vaccine" (Recent)

3- Inactivated  $O_1$ :

• Type: Inactivated • Route: S/C in dewlap

• Dose: 2ml "Cattle & buffalo" & 1ml "Sheep & Cal"

• Booster dose: After 4 months



•Age: a- In case of calf from vaccinated dam

→ Age: 6 months

→ Booster dose: at 10 months of age

b- In case of calf from non-vaccinated dam

→ Age: 4 months

→ Booster dose: at 8 months of age

### ■RP:-

a -By vaccination either by caprinized vaccine, lapinized vaccine, avianized vaccine or culture adapted vaccine

b -Vaccination of calves by "**Rinderpest vaccine**" at the age of:

•If the mother was vaccinated → 6 months

• If the mother wasn't vaccinated & there's no risk → 4 months

• If the mother wasn't vaccinated & there's risk → Day 1

c -Vaccination program:

•Dose: 1 ml      •Route: S/C      •Age: as previous      •Immunity: life-long immunity

### ■LSD:-

#### ● Sheep Pox V.:

•Name: Sheep Pox V.      •Dose: 0.5 ml      •Type: Live attenuated

•Booster dose: After 3 years      •Route: I/D in tail fold

•Age: Calves that are over 6 month of age

### ■BEF:-

#### ♦VACCINE PROGRAM:

•Route: S/C      •Booster dose: After 6 months

•Age: 1<sup>st</sup> dose at 6 months of age → 2<sup>nd</sup> dose after 4 wks.

### ■CBPP:-

•Type: Live attenuated virulent vaccine (prepared from pleural exudate that cultured in broth)

•Route: S/C at the tip of tail      •Immunity: 1 - 2 years

♦N.B/ 1- Calves that are less than 2 m. are not vaccinated as this vaccine causes hygroma

## ■ Pasteurellosis:-

### ■ Vaccine program (1):-

- Name: HS oil adjuvant vaccine
- Dose: 2ml in cattle & buffalo & 1ml in sheep (2 doses with 2 wks. interval then annual re-vaccination)
- Type: Killed oil emulsion (prepared from selected strains of P.multocida type B & Inactivated by formalin)
- Route: I/M in hind quarter
- Booster dose: Every year

### ■ Vaccine program (2):-

- Name: PH - PM bacterin
- Dose: 2ml → 2 wks. → 2 ml
- Age: at 3 months of age
- Route: S/C
- Booster dose: Prior stress condition (3 wks.)

## ■ Brucellosis:-

### 1- Calf-hood living attenuated vaccine (B<sub>19</sub>):

- Brucella abortus strain 19 in aqueous or lyophilized form (Live attenuated)
- It's the vaccine of choice of sexually immature ♀s (4 – 17 months of age)
- Booster dose is done by non-agglutinogenic vaccine (45/20) "Killed vaccine"
- In general this vaccine is not recommended because A-b persist longer → False +ve in testing
- Disadvantages:
  - a- Abortion of vaccinated cows in late pregnancy (1 – 2%) "Abortogenic"
  - b- Infection & undulant fever may occur in human
  - c- Doesn't prevent infection completely (Specially in udder)
  - d- Severe post-vaccinal reactions (Inflammation, fever & anorexia)
  - e- Used in ♀s only
  - f- Problems of storage & Transportation (4°C is required)

### 2- Abortex:-

- Strain 45/20 oil adjuvant killed vaccine
- Indicated for immunization of cows, heifers, sheep & goat herds that are free from brucellosis



•Used in Egypt in —ve adult cows, bulls & pregnant ♀s

•Ineffective when given before 6 months of age so it's administered after 6 months of age

•Used I/M or S/C

•No agglutinating activity

•Boostered after 6 months

### 3- H<sub>38</sub> Abrolane:-

•Oil adjuvant killed vaccine

•Inactivated B.melitensis strain 38

•Agglutinogenic after 12 – 24 months of vaccination

•given in 2 doses

### 4- Rev.1 vaccine:-

•Live attenuated strain of B.melitensis that is used in sheep & goat

•The dose is 1 – 2ml S/C

•agglutinogenic

### 5- RB<sub>51</sub>:-

•Live attenuated B.abortus strain 51

•Used for ♀s

•Non-agglutinogenic

•2ml S/C & given at 6 – 12 months of age

N.B/ Strain 45/20 protects free herds while infected herds is given strain 19 vaccine

### ■Leptospirosis:-

•Type: Multivalent bacterin that contains the serovar of the endemic region

•Route: S/C

•Age: Over 6 months

•Dose: 2 ml → 1 month → 2 ml

•Booster dose: Every year

•Disadvantage: It may develop carrier state

### ■VP:-

•Type: Live larvae attenuated by gamma-irradiation

•Route: Per OS

•Dose: 1000 infective larvae

•Age: 2 Months

•Dose → 4 wks. → Dose

### ■Babesiosis:-

•Monovalent or Bivalent vaccine (contains B.bovis & B.bigemina) → Live organisms that are given to animal & give immunity for 1 year (Animal should not take imizol before vaccination at least for 8 wks. before vaccination)

### **Anaplasmosis:-**

- Live A. marginale: Used in animals that are under 1 year  
(Disadvantage: Creation of large population of carrier animals that can spread the disease)
- Live A. centrale: it may cause inapparent mild disease
- Killed A. marginale

### **Causes of vaccination failure:-**

- 1- Massive exposure of vaccination (High dose of Ag that exceeds the amount of Ab formation of the body → Appearance of clinical signs)
- 2- Mutation of M.O → Production of new strains of M.O
- 3- Exposure before vaccination → Non-proper time vaccination
- 4- Damage of the vaccine (Improper storage, contamination, Faults during transportation)
- 5- Partial herd vaccination → it causes the M.O to be shed with high No. & virulence so the rest of herd will be infected
- 6- Concurrent illness "Stress" as transportation of animals → Immuno-suppression → The immune system won't produce Abs
- 7- Incorrect administration of vaccine → S/C instead of I/M in virashield vaccine
- 8- Improper washing of equipment after sanitation → Presence of chemical disinfectant that kill the M.O presented in vaccine

### **Adverse effect of vaccination:-**

- 1- Clinical signs may be produced
- 2- Abortion
- 3- Anaphylactic shock → results from excessive revaccination by inactivated vaccine
- 4- Activation of latent infection (The vaccine may act as a stress → Immunosuppression → activation of latent infection)

## **Section 9 (Lab. Diagnosis of brucellosis)**

### **Diseases causing Icteric m.m:-**

- Babesiosis (congested → pale → icteric)
  - Thielerosi
  - Anaplasmosis
  - Leptospirosis
- ♦ m.m could become pale after that



**•Diseases causing Respiratory signs:-**

- IBR
- HS
- CBPP
- VP
- T.B

**•Diseases causing sudden death:-**

- RP
- Acute form of fascioliasis
- Per-acute form of HS

**•Diseases causing Death after short course:-**

- Per-acute form of mastitis
- Babesiosis
- FMD in young

**•Diseases causing oral lesions:-**

- RP "With diahrrea"
- MCF "With diahrrea"
- BVD "With diahrrea"
- IBR "With diahrrea"
- FMD "Without diahrrea"
- CBP "Without diahrrea"

**•Diseases causing Diahrrea:-**

- RP "with oral lesions + high morbidity & high mortality"
- MCF "With diahrrea + enlargement of L.Ns"
- BVD "With perfuse watery diahrrea mixed with blood & mucous"
- IBR "With diahrrea"
- JD "Pea soap diahrrea"
- SFD "Offensive odor diahrrea without blood or mucous"

**•Diseases causing Lesions on genitalia:-**

- Brucellosis
- LSD
- IBR

**•Diseases causing Skin Lesions:-**

- Mange
- LSD
- CBP
- Ring worm
- DPH

**•Diseases transmitted by insects:-**

- Brucellosis "mechanically by blood sucking mosquitoes"
- Babesiosis "Tick"
- Theileriosis "Tick"
- Anaplasmosis "Tick"

- LSD "mechanically by blood sucking mosquitoes"
- EBL "mechanically by blood sucking mosquitoes"
- AKA "mechanically by blood sucking mosquitoes"
- CBP "mechanically by blood sucking mosquitoes"
- BEF "mechanically by blood sucking mosquitoes"

#### ●Diseases causing Nervous manifestations:-

- MCF
- IBR
- BSE
- Babesiosis
- Leptospirosis

#### ●Diseases causing enlarged L.N:-

- MCF
- LSD
- Theileriosis

#### ●Diseases causing corneal opacity:-

- MCF
- BVD
- IBR
- IBK
- Theileriosis

#### ●Diseases causing Prenatal infection:-

- BVD
- IBR
- AKA
- EBL
- Ascariasis
- Leptospirosis
- JD
- T.B

#### ●OIE list (A) diseases:-

- RP
- FMD
- LSD
- CBPP

#### ●Notifiable diseases:-

- RP
- FMD
- BSE
- Brucellosis

#### ●Diseases that have Good prognosis:-

- BEF

#### ●Diseases that have Bad prognosis:-

- RP
- MCF
- EBL
- BSE
- AKA
- Brucellosis
- JD
- BEF (In case of S/C emphysema)



**•Diseases that could be transmitted venereally:-**

- BVD
- IBR
- T.B
- Leptospirosis
- Brucellosis (A.I only)
- JD
- FMD (A.I only)
- LSD

**•Diseases causing salivation:-**

- IBR
- RP
- FMD
- BVD
- BEF

**•Diseases that age plays an important role in its transmission:-**

- BVD → 6 – 24 months
- FMD → High fatality in young animals
- CBP → calves are severely affected
- IBR → High fatality in young animals
- LSD → Young ages are more susceptible
- BEF → 6 – 24 months
- EBL → Old ages have high rate of infection specially dairy herds
- AKA → Signs appears in neonates
- BSE → Old ages have high rate of infection
- Pasteurellosis → 6 – 24 months "around 1 year"
- JD → Infection occurs at the 1<sup>st</sup> 6 months of age but signs appears at 2 – 4 years
- Brucellosis → Signs appears after sexual maturity because of erythritol
- T.B → Old ages have high rate of occurrence
- Leptospirosis → Newly born animals are more susceptible to septicemic form
- Babesiosis → Suseptibility after 9 months of age
- Actinobacillosis → Occurs mainly in adults
- Actinomycosis → Occurs mainly in young
- Mange → Occurs mainly in adult animals
- Fascioliasis → 4 – 12 months "Yearling animal"
- Paramphistomiasis → 4 – 12 months "Yearling animal"
- PG → Young are more susceptible to severe form
- Anaplasmosis → 2 – 3 years of age
- Ascariasis → Young are more susceptible to severe form

**•Diseases causes zebra stripping:-**

- BVD
- RP

**•Diseases transmitted by semen:-**

- BVD
- FMD
- IBR
- LSD
- JD
- Brucellosis
- T.B
- Leptospirosis

♦ Diseases causes congenital anomalies:-

- BVD

- AKA

| Items                 | Live vaccine                                                                                                      | Killed vaccine                                                                            |
|-----------------------|-------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------|
| Safety                | <u>Not safe</u> as it has both the antigenic part & the pathogenic part so it causes symptoms                     | <u>Safe</u> as it has no pathogenic part                                                  |
| Dose                  | <u>Low</u> to prevent multiplication & ↑ virulence & shedding of M.O <u>so partial herd vaccination is banned</u> | <u>High</u> to enhance the immune system to produce Abs ( <i>Injected with adjuvant</i> ) |
| Booster dose          | After long time                                                                                                   | After short time                                                                          |
| Duration of immunity  | Long                                                                                                              | Short                                                                                     |
| Humeral immunity      | Enhanced                                                                                                          | Enhanced                                                                                  |
| Cellular immunity     | Enhanced                                                                                                          | Not Enhanced                                                                              |
| Multiplication of M.O | Occurs                                                                                                            | Doesn't occur                                                                             |
| Signs & symptoms      | Occur                                                                                                             | Don't occur                                                                               |
| Abortion              | Occur                                                                                                             | Don't occur                                                                               |

♦ Diseases arrangement:-

- |                                      |                                      |              |
|--------------------------------------|--------------------------------------|--------------|
| 1- T.B & JD                          | 2- Brucellosis                       | 3- Mastitis  |
| 4- HS & CBPP                         | 5- Babesiosis, TT & Anaplasmosis     | 6- BVD & IBR |
| 7- LSD & CBP                         | 8- BEF & FMD                         | 9- RP & MCF  |
| 10- Fascioliasis & Paramphistomiasis | 11- AKA, EBL & BSE                   |              |
| 12- Ascariasis & VP                  | 13- Actinomycosis & Actinobacillosis |              |
| 14- Mange, Ring worm & DPH           | 15- PG                               |              |

♦ Cases:-

• Yearling calves showing fetid offensive odor diarrhea without blood & mucous; some of them show bottle jaw & others show pale m.m

- Answer: Paramphistomiasis

• A cow showing pale anemic m.m membrane with enlargement of L.Ns & a temp. of (39.8°C)

- Answer: Theileriosis

• A cow showing pale m.m membrane with Hburea & a temp. of (41°C)

- Answer: Acute babesiosis



• In a farm of 150 Buffaloes 130 were showing severe diarrhea, salivation & oral lesions & then 120 animal were died

- Answer: RP

• In a farm; at the 1<sup>st</sup> day of infection the animal shows high fever ( $41^{\circ}\text{C}$ ), drop-of milk production, lameness & some of them when given oral medications they suffered severe pneumonia. 2 days later some of the diseased animals became normal with normal temperature

- Answer: BEF

• In a farm of 150 Buffalo calves; 130 were showing severe diarrhea, salivation, lameness & oral lesions & then 120 animals were died

- Answer: FMD

• In a farm of 150 Buffaloes; 3 animals were showing corneal opacity with diarrhea & oral lesions

- Answer: MCF

• In a farm; cows showed frequent urination after coitus, others shows lesions on genitalia & others shows abortion in different times

- Answer: Genital form of IBR

• A cow showing severe icterus without Hburea & a temp. of ( $41.5^{\circ}\text{C}$ )

- Answer: Anaplasmosis

• Calves showing constipation & off food with sometimes abdominal pain

- Answer: Ascariasis

• Yearling calves showing jaundice & loss of condition; some of them show bottle jaw & others show pale m.m

- Answer: Fascioliasis

• In a farm consists of 300 animals; 250 were showing high fever with characteristic posture & painful respiration & 150 were died

- Answer: CBPP

• 6 years old cow shows severe emaciation with pea soap diarrhea that doesn't respond to treatment

- Answer: JD

• In a recently shipped feed lot steers in which some animals were suddenly died & others showing bloody diarrhea & others showing respiratory distress with snoring respiration & edema in dewlap & some of them shows mixture between the mentioned above

- Answer: HS

• During the summer course in MUVH (Mansoura University Veterinary Hospital); a cattle calf was arrived; its clinical examination revealed that, the body temperature was 41°C, with enlarged LNs; while the case history was that the disease was showed in cattle only & the treatment doesn't shorten the long course of the disease

- Answer: LSD

• A 4 years old cow submitted to your clinic suffering enlarged L.N with occurrence of sudden onset with climatic changes, The animal was free grazing & high producing animal before occurrence of the disease

- Answer: BEF

### **Lab. Diagnosis scheme:-**

#### **1- Sample:**

- Most of viral diseases → Whole blood & serum + tissues according to disease
- Pox viruses → Scabs + skin biopsy are the most important
- Diseases causes enlarged L.N → L.N or L.N biopsy
- BSE → Brain                      • FMD → Vesicle or vesicular fluid                      • Parasitic diseases → Feces
- VP → Sputum & feces                      • Blood parasites → Ticks & blood
- Bacterial diseases → tissues or blood according to disease

#### **2- Tests:**

##### **- Viral diseases**

(a) Isolation & identification of V. → On Tissue culture (Vero cells)

(b) Detection of Viral Ag by → **AGID & ELISA**

(c) Detection of Ab by → **PHA, CFT, ELISA & AGID**

(d) Histopathological examination



- IBR → MDBK

- BEF & FMD → BHK<sub>21</sub>

- CBP & LSD → CAM of ECE

- Parasitic diseases → fecal examination

- Blood parasites → blood smear & staining

- Bacterial diseases → isolation of M.O on agar media OR stained smears

(a) Brucellosis → Tryptose soya agar or Brucella albimi agar at pH 6.6 - 6.8 with 10% CO<sub>2</sub>

(b) CBPP → PPLO media

(c) HS → Blood or Chocolate agar at 37°C / 24 - 48 hrs. & colonies appear moderate size, round & Grayish with characteristic odor & non-hemolytic

(d) JD → on specific media with mycobactin & growth factors (For 12 wks.)

(e) T.B → Lowenstein-Jensen media or Egg yolk agar media & incubated for 8 wks. at 37°C

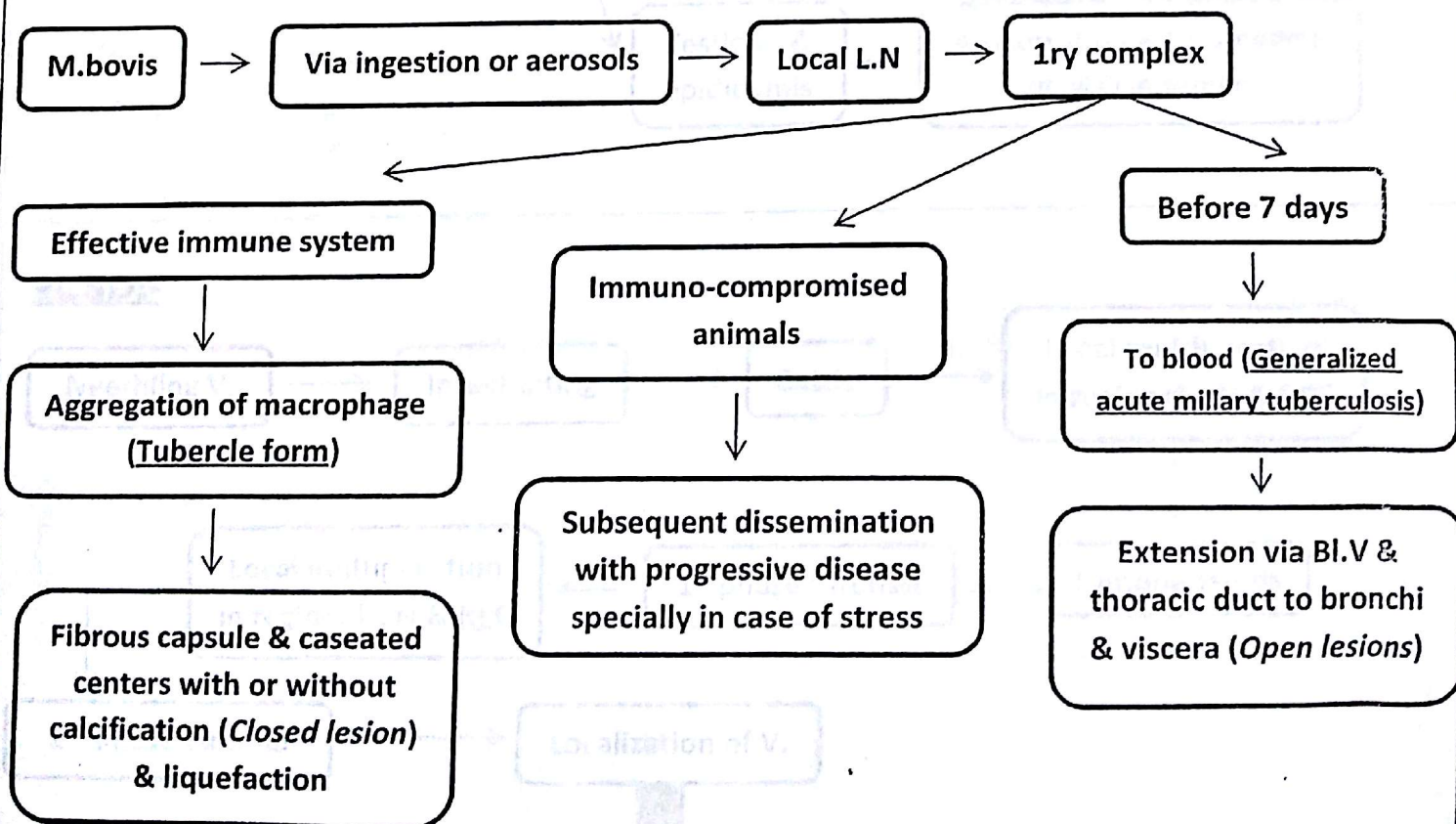
- T.B & JD → ZN stain

- HS → Bipolarity

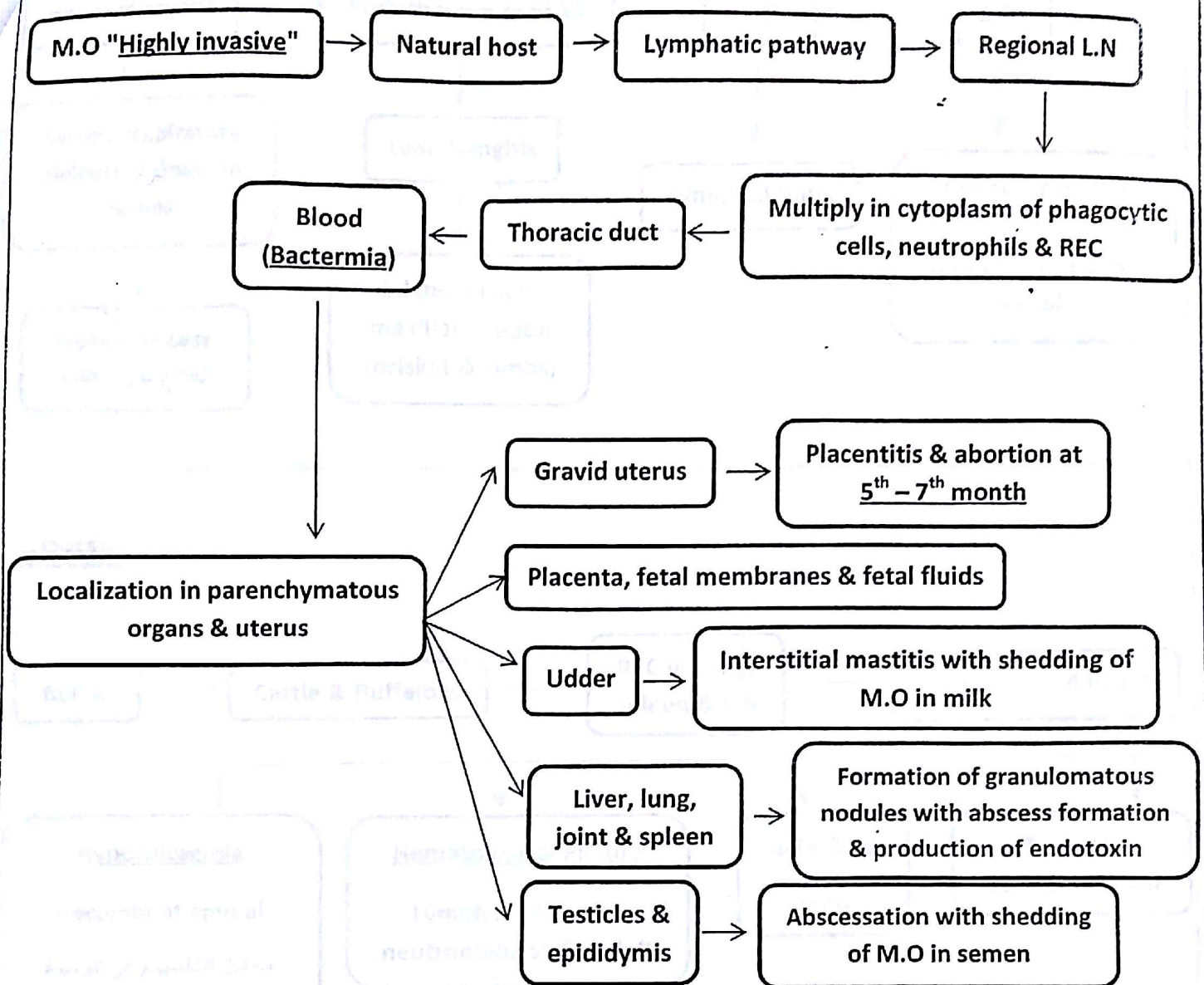
- Leptospirosis → slender, spiral M.O that's stained by **Fontana stain** & seen under dark field microscope

### ▲ Pathogenesis:-

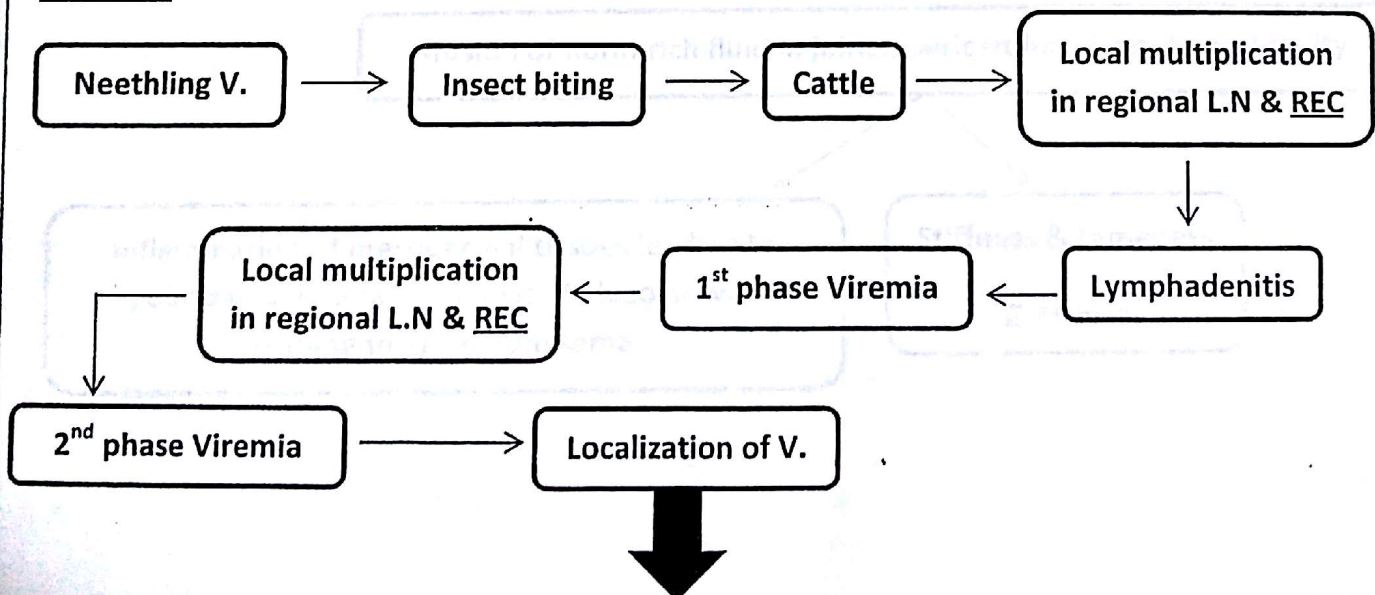
#### ■ T.B:-



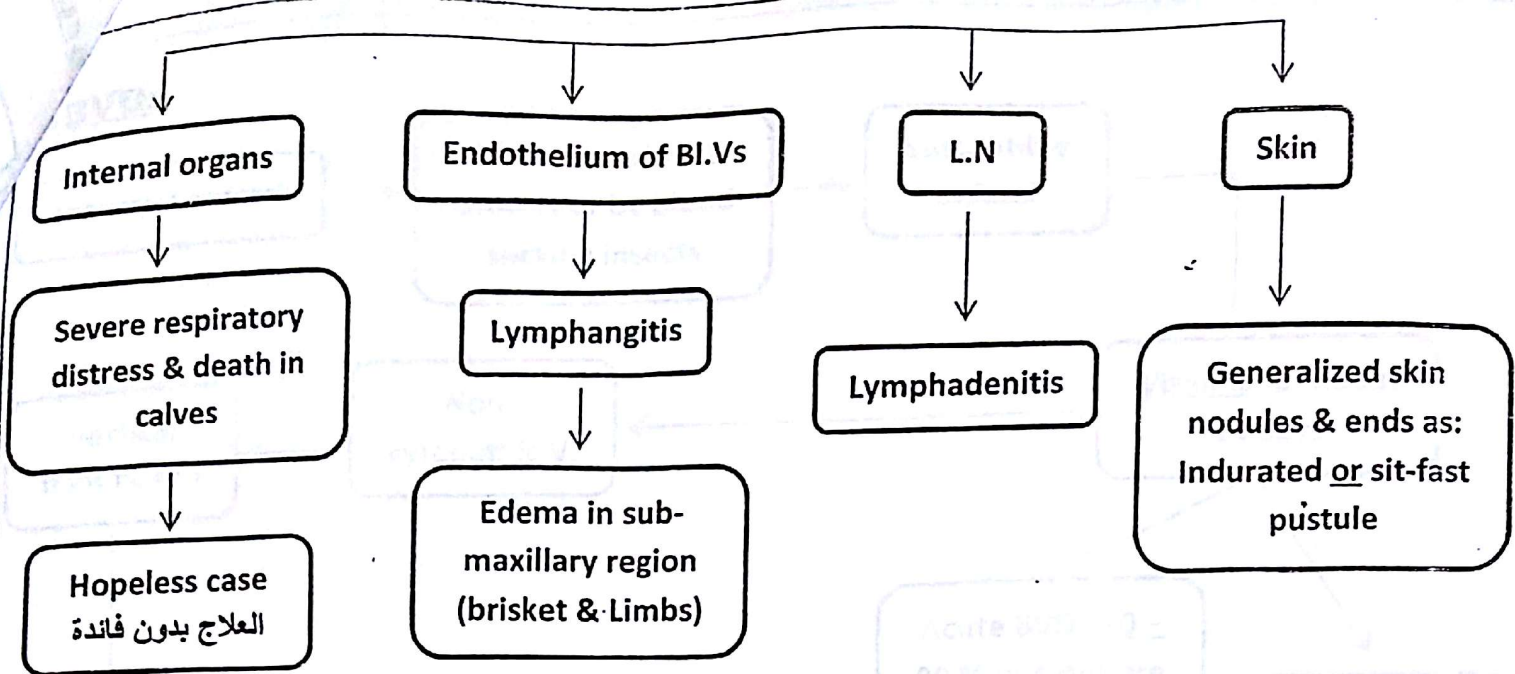
## ■ Brucellosis:-



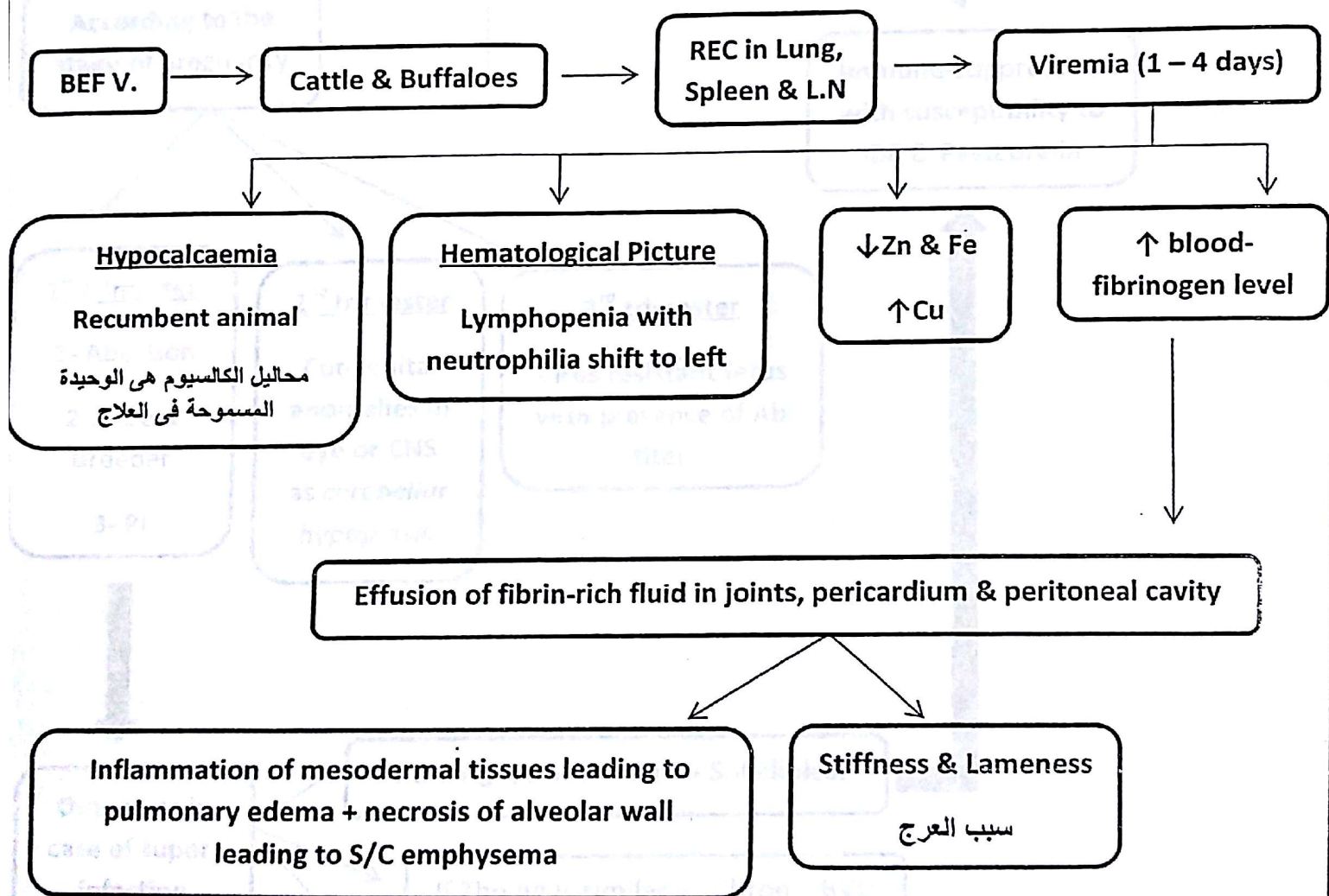
## ■ LSD:-





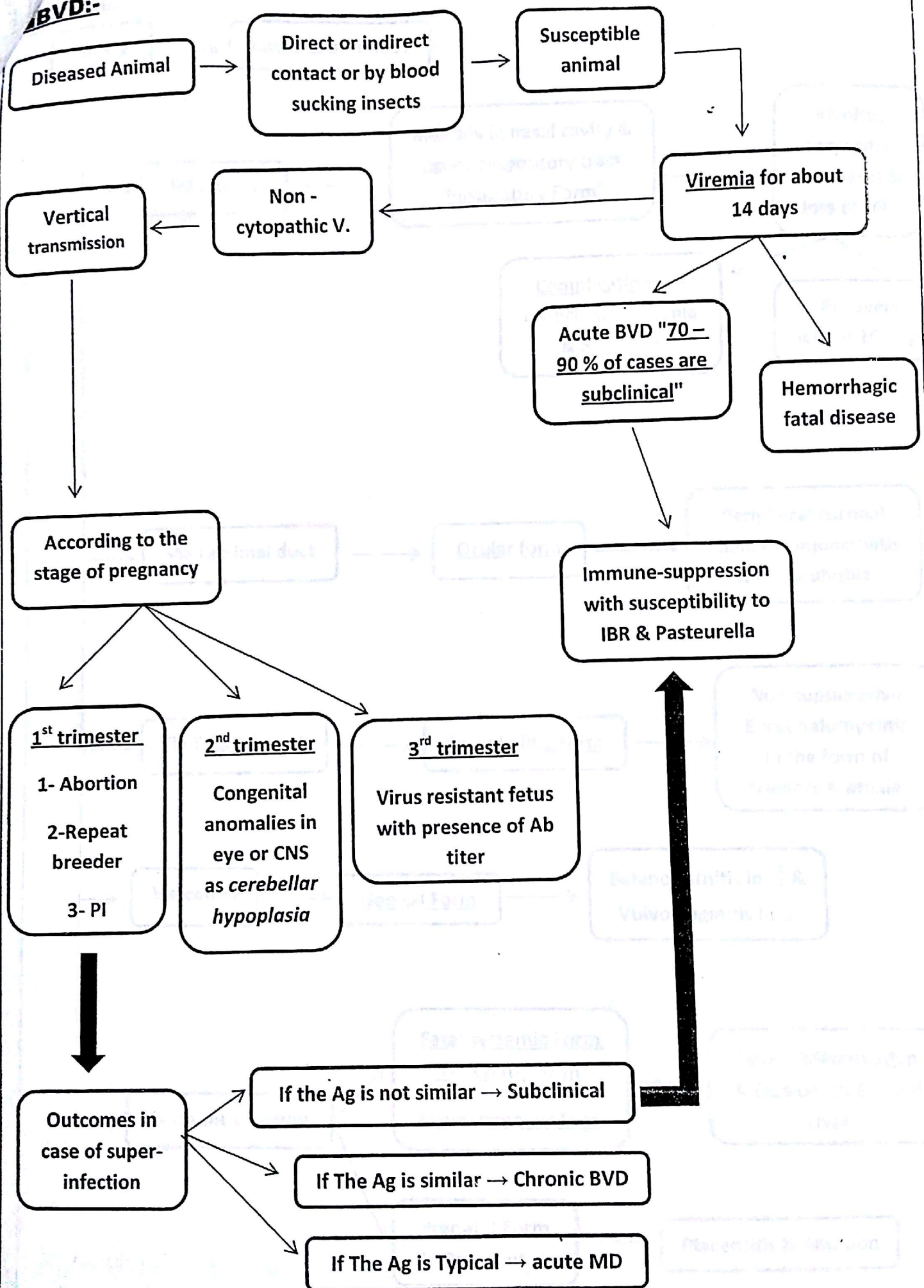


### ■ BEF:-



If The Ag is Typical → acute MC

## BVD:-





## IBR:-

BHV-1

Cattle & buffaloes

Inhalation

Multiply in nasal cavity &  
upper respiratory tract  
"Respiratory Form"

Rhinitis,  
Laryngitis,  
Tracheitis &  
loss of cilia

Complications →  
bronchopneumonia  
& Red nose

Recovery  
within 10 days

Via Lacrimal duct

Ocular form

Peripheral corneal  
edema, Conjunctivitis  
& Photophobia

Via Trigeminal N.

Encephalitic Form

Non-suppurative  
Encephalomyelitis  
in the form of  
tremors & ataxia

Via coitus

Genital Form

Balanoposthitis in ♂ &  
Vulvo-vaginitis in ♀

Systemic invasion

Fatal systemic Form

"Post natal form"

Alimentary tract Form

Fever, Inflammation  
& Erosions in GIT and  
Liver

Prenatal Form  
in Pregnant ♀

Placentitis & Abortion

## ♣ Babesiosis:-

### ■ Enzootic stability (chemo-immunization) [Premunity – Premunation]:

- Claves from infected dams contain maternal Abs for 3 months with natural killers that are incriminated inside RBCs → When the calf is infected within 3 months → More initiation occurs of natural killers (*Age resistance remains until 9<sup>th</sup> month*)
- **Therapeutic dose** of anti-babesial agents is used to develop **long-standing immunity**

### ■ How to establish enzootic stability (chemo-immunization)?!

- 1- Spleenectomy of calf
- 2- Induce the infection in the spleenectomized calf
- 3- Count the parasitized RBCs in blood film till reach  $10^7/\text{ml}$  then this calf is considered as donor
- 4- Take 2ml of blood from such calf → Injected S/C in another healthy calf to infect it
- 5- Monitor the 2<sup>nd</sup> animal till fever stage
- 6- Inject imidazole in the 2<sup>nd</sup> day of fever (Therapeutic dose not the sterilizing one) so a state of immunity is established

### ■ Imported foreign heifers to endemic areas:

- 1- It should be vaccinated 30 days before arrival
- 2- Prophylactic dose at arrival of imizol (2.5 cc / 100 Kg)
- 3- Chemo-immunization could be done then a dose of imizol is given 7 days later (for formation of anti-bodies then killing of parasites)

## ♣ LSD:-

### ● Misusage of LSD vaccine (Causes that made LSD endemic in Egypt):-

- 1- Vaccination S/C instead of I/D
- 2- Revaccination after 6 months instead of 1 year that lead to ↓ the immunity & ↓ anti-body titre in blood
- 3- Partial vaccination of animals that lead to presence of animals with high anti-body titre & others with low anti-body titre
- 4- Changing the Romanian strain to Kenyan strain

### ♦ Controlling the problem:-

- 1- Vaccination by sheep pox virus (Sheep take double dose of cow)



- ← Sero-surveillance (If Ab titre is high → don't vaccinate & if the Ab titre is low → vaccinate)
- 3- Measuring the efficacy of vaccination using ID<sub>50</sub>

## **•Rule of Lab. Animals in diagnosis of some diseases:-**

### **1- FMD:-**

- a- I/P injection of specimen in **baby mice** at 2 – 7 days old → death and detection of V. using known Abs by IFT
- b- I/Dermo – planter injection of specimen in **G.Pig** → 7 – 8 days later → Vesicle formation without death

### **2- BEF:-**

- I/C in suckling mice (7 days old) → death

### **3- Brucellosis:-**

- I/P injection in G.pig → Orchitis (**Strauss reaction**)

### **4- Leptospirosis:-**

- Inoculation in Guinea Pig (1ml of suspected sample I/P & after 3 – 5 days the animal scarified & examined for presence of M.O)

### **5- Pasteurellosis:-**

- Samples are injected **I/P in rat** → Death after **24 - 36 hrs.**

### **6- T.B:-**

- Isolation of M.O in G.Pig

### **7- Babesiosis & Anaplasmosis:-**

- Injection of blood from suspected cases in splenectomized animals (**For detection of chronic cases**) → Transmission test in rabbit

| Items                                                | BVD                                                                                                                                                                                                                                                                                                                                                                                                                                                            | IBR                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Syn.                                                 | BVD – MD                                                                                                                                                                                                                                                                                                                                                                                                                                                       | IBR, IPV, Infectious Pustular Vulvo-vaginitis, Red Nose, IPB & Bovine Herpes V.-1 infection                                                                                                                                                                                                                                                                                                                                                                                                             |
| Def.                                                 | <ul style="list-style-type: none"> <li>- Acute or chronic infectious viral disease of cattle, <u>characterized by:</u></li> <li>- <b>Fever &amp; Diarrhea</b></li> <li>- Ulceration &amp; erosions in the alimentary tract mucosa, Salivation, Respiratory signs</li> <li>- <b>Abortion &amp; congenital anomalies</b></li> <li>- <b>Hemorrhagic syndrome</b> that could be fatal</li> </ul>                                                                   | <ul style="list-style-type: none"> <li>- Highly infectious viral disease of cattle and buffaloes caused by Bovine herpes virus-1 &amp; <u>characterized by:</u></li> <li>- Fatal systemic changes <u>"at the 1<sup>st</sup> 30 days of age"</u></li> <li>- Rhino-Tracheitis <u>"at the 1<sup>st</sup> 6 months of age"</u></li> <li>- Conjunctivitis <u>"at any time"</u></li> <li>- Fever, short course &amp; high recovery rate</li> <li>- Balanoposthitis in ♂ &amp; Vulvo-vaginitis in ♀</li> </ul> |
| Etiology                                             | <ul style="list-style-type: none"> <li>• RNA V. → F. Togaviridae</li> <li>- The virus has <b>2 biotypes</b> → cytopathic &amp; non-cytopathic</li> <li>- Each <b>biotype</b> has <b>2 genotypes</b> → 1 &amp; 2</li> <li>- Non-cytopathic type is more common than cytopathic one</li> <li>- Non-cytopathic type could be present in semen sample without any hazard to sperms so the disease could be transmitted <u>through coitus "venereal"</u></li> </ul> | <ul style="list-style-type: none"> <li>• BHV-1 "Bovine Herpes V. 1" → F. Herpesviridae</li> <li>- The virus may survive up to <b>1 year</b> in frozen semen at <b>-196°C</b></li> <li>- BHV-2 causes Allerton's disease</li> </ul>                                                                                                                                                                                                                                                                      |
| <b>Epidemiology</b><br><b>1- Source of Infection</b> | <ul style="list-style-type: none"> <li>- The virus presents in nasal discharge and also milk, feces, urine, tears, semen, placental fluid &amp; fetal tissue</li> <li>- Persistent infected calf <b>"PI calf"</b> considered as a major source of infection</li> </ul>                                                                                                                                                                                         | <ul style="list-style-type: none"> <li>- Diseased &amp; Latent infected animals through:</li> <li>• Nasal &amp; ocular discharge</li> <li>• Reproductive secretions "semen &amp; fetal fluids"</li> <li>• Aborted Fetus</li> </ul>                                                                                                                                                                                                                                                                      |
| <b>2- Mode of transmission</b>                       | <ul style="list-style-type: none"> <li>- <b>Horizontal</b> → through ingestion or inhalation any object contaminated by the virus through discharge, urine or feces <b>OR</b> through blood sucking insects <b>OR</b> venereal</li> <li>- <b>Vertically</b> → non-cytopathic type can cross placenta causing problems depends on the Stage of pregnancy</li> </ul>                                                                                             | <ul style="list-style-type: none"> <li>- By <u>direct contact</u> through:</li> <li>- Inhalation <b>"Main Route"</b></li> <li>- Venereal transmission during coitus or A.I</li> <li>- Vertical transmission → Trans-placental</li> </ul>                                                                                                                                                                                                                                                                |



- Cattle and buffaloes

| 3- Host                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
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| 4- Factors affecting susceptibility | <ul style="list-style-type: none"> <li>- Age → Majority of disease occurs at <b>6 – 24 months</b></li> <li>- Stage of pregnancy: <ul style="list-style-type: none"> <li>• 1<sup>st</sup> trimester → abortion, repeat breeder or PI</li> <li>• 2<sup>nd</sup> trimester → abortion &amp;/or congenital anomalies</li> <li>• 3<sup>rd</sup> trimester → Resistant fetus</li> </ul> </li> <li>1- PI calf → calf born to infected mother that has the V. without antibodies</li> <li>2- Resistant calf → Calf that has antibodies without V.</li> </ul>                                                                                                                                                                                                                                                                                                                                                          | <ul style="list-style-type: none"> <li>a- Calves that are less than 2 wks. old has high fatality rate</li> <li>b- Fed lot cattle has higher attack rates than dairy cattle</li> <li>c- <u>Season</u> has little significance because at winter the susceptibility of the disease ↑</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|                                     | <ul style="list-style-type: none"> <li>3- <u>Acute form "Acute MD"</u>: <ul style="list-style-type: none"> <li>• Low morbidity "<u>sporadic</u>" &amp; high mortality</li> <li>• occurs at 6 – 24 months of age</li> <li>• Fever (40 - 41°C)</li> <li>• Perfuse watery diarrhea for 2 – 4 days with foul smelling &amp; contain mucous or blood</li> <li>• Epistaxis with thrombocytopenia</li> <li>• Pregnant ♀ may abort</li> <li>• Erosions &amp; ulcers on the oral cavity, nostrils &amp; pharynx</li> <li>• <u>Corneal opacity "from center to peripheries"</u></li> </ul> </li> <li>4- <u>Chronic form</u>: <ul style="list-style-type: none"> <li>• Occurs as a sequel to subclinical infection <u>or</u> non-fatal cases</li> <li>• Intermittent or continuous diarrhea → Progressive emaciation &amp; weakness</li> <li>• Erosions on perineum, vulva, scrotum &amp; prepuce</li> </ul> </li> </ul> | <ul style="list-style-type: none"> <li>1- High morbidity and low mortality</li> <li>2- <u>Respiratory form</u>: <ul style="list-style-type: none"> <li>- High fever (40 - 42°C)</li> <li>- Serous nasal discharge</li> <li>- Open mouth breathing</li> <li>- Shallow rapid respiration with persistent cough</li> <li>- Recovery occurs within 14 days if there are no complications</li> <li>• In case of complications → <b>Bronchopneumonia</b> with mucopurulent nasal discharge, diptheritic membrane over the naso-tracheal mucosa, Hyper-salivation and <u>Hyperemic, edematous &amp; hemorrhagic focal necrosis of nasal mucosa (Red Nose)</u></li> </ul> </li> <li>3- <u>Fatal systemic form</u>: <ul style="list-style-type: none"> <li>- Occurs in newly born calves</li> <li>- Fever, excessive salivation &amp; watery diarrhea</li> <li>- Unilateral or Bilateral Conjunctivitis</li> <li>- Hyperemic &amp; Erosive oral mucous membrane</li> </ul> </li> <li>4- <u>Ocular form</u>: ✓ <ul style="list-style-type: none"> <li>- Bilateral Conjunctivitis</li> <li>- Kerato-Conjunctivitis</li> <li>- Photophobia</li> <li>- Serous to mucopurulent ocular discharge</li> <li>- Corneal opacity → from center to periphery</li> </ul> </li> <li>5- <u>Encephalitic form</u>: <ul style="list-style-type: none"> <li>- Incoordination</li> <li>- Excitement</li> <li>- Convulsions &amp; blindness</li> <li>- Ataxia &amp; tremor</li> </ul> </li> </ul> |

Signs

|     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
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|     | <ul style="list-style-type: none"> <li>• Fetal abnormalities, abortion &amp; mummification</li> <li>• Retardation of growth till developing of fatal form or other infections as: <u>pneumonia</u> due to <u>Immune-suppression</u></li> <li>3- <u>Inapparent, subclinical or mild form</u>:             <ul style="list-style-type: none"> <li>• High morbidity &amp; low mortality</li> <li>• Mild fever</li> <li>• <u>Leukopenia with mild diarrhea</u> ****</li> </ul> </li> <li>4- <u>Congenital defects in calves</u>:             <ul style="list-style-type: none"> <li>• Cerebellar – ocular agenesis "<u>Ataxia</u>"</li> <li>• Musculoskeletal abnormalities</li> </ul> </li> </ul> | <p><b>6- Genital Form:</b></p> <p>◆ <u>Infectious Pustular Vulvo-vaginitis (IPV)</u> → <u>Necrotic lesions</u> on mucosa of vulva &amp; vagina</p> <p>- Ch. By:</p> <ol style="list-style-type: none"> <li>1- the cow shows signs of pain</li> <li>2- arches her back with frequent urination</li> <li>3- Swollen vulva with yellow discharge &amp; small white pustule inside it</li> <li>4- Drop of milk production</li> <li>5- Recovery occurs within 3 – 4 wks.</li> </ol> <p>◆ <u>Infectious Pustular Balanoposthitis (IPB)</u> → <u>Necrotic lesions</u> on mucosa of Prepuce &amp; glans penis</p> <p>- Ch. By:</p> <ol style="list-style-type: none"> <li>1- Pustule formation on glans penis</li> <li>2- Swollen sheath of prepuce &amp; glans penis</li> <li>3- The infected bull disseminate the infection between cows</li> <li>4- Balanoposthitis &amp; Orchitis with ulcers on the genitalia</li> </ol> <p><b>7- Sequel of Respiratory form:</b></p> <ul style="list-style-type: none"> <li>• Delayed abortion few wks. after infection or after vaccination by live attenuated vaccine</li> <li>• Abortion occurs between 5<sup>th</sup> – 9<sup>th</sup> month of pregnancy</li> <li>• Endometritis, Retention of placenta, mummification of fetus &amp; Poor conception</li> </ul> <p>- Whitish necrotic areas raised above the mucosal surface in nasal cavity &amp; trachea</p> <p>- Congested tracheal mucosa with Pustular lesions</p> <p>- In case of <b>IPV</b> → Pustules, ulcers &amp; necrotic lesions present on the mucosa of vulva</p> <p>- In case of <b>IPB</b> → Pustules, ulcers &amp; necrotic lesions present on the mucosa of prepuce</p> |
| P/M | <ul style="list-style-type: none"> <li>- Dehydrated carcass</li> <li>- Shallow erosions with very little inflammation around it present among <b>mouth, pharynx, stomach &amp; larynx</b></li> <li>- Congenital defects in calves could be observed</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |



- Depends on case history, Clinical signs & P/M

| ↓Diagnosis                |                                                                                                                                                                                                                                                                                                                                                                                                                                    | - Depends on case history, Clinical signs & P/M                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|---------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1- Field diagnosis        |                                                                                                                                                                                                                                                                                                                                                                                                                                    | <b>• Sample:</b><br>1- Any frozen discharge, Semen<br>2- Paired serum sample with 14 days interval<br>3- Whole Blood                      4- fetal lung, fetal spleen, L.N<br><b>• Tests:</b><br>- Detection of Viral Ag by → <b>AGID &amp; ELISA</b><br>- Isolation & identification of V. → On MDBK and detect CPE by IF<br>- Detection of Ab by → <b>PHA, CFT, ELISA &amp; AGID</b><br>- Histopathological examination → for detection of <b>acidophilic INIB "Cowdry type A"</b> |
| 2- Lab. diagnosis         | الجول<br>↓                                                                                                                                                                                                                                                                                                                                                                                                                         | <b>• Rabies</b> → Negri Bodies<br><b>• Lead poisoning</b> → Blue line of the gum<br><b>• Pink eye</b> → Morexilla bovis<br>Usually Favorable unless complications occur                                                                                                                                                                                                                                                                                                              |
| 3- Differential diagnosis | <b>MCF</b> → corneal opacity from periphery to center<br><b>RP</b> → High morbidity and high mortality<br><b>IBR</b> → Respiratory manifestations are more common                                                                                                                                                                                                                                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| Prognosis                 | - Acute form → unfavorable<br>- Subclinical or mild form → favorable                                                                                                                                                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| Treatment                 | - Broad spectrum Anti-biotic: Oxytetracycline (1cc / 10Kg) (I/M for 3 successive days)<br>- Anti-inflammatory drug: Fenadryne (1cc / 45 Kg) (I/M for 3 days)<br>- Anti-pyritic: Analgin (7cc / 100Kg) • Electrolyte therapy → for controlling dehydration<br>• Anti-diarrhea drugs → for controlling diarrhea with supportive treatment (BVD)<br>• Broad Spectrum antibiotic ointment → Topical on the lesions for IPB & IPV (IBR) |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| Prevention & Control      | <b>1- Control:</b><br>a- Isolation of infected animals<br>b- Disinfection of equipment by phenol 2%<br>c- Vaccination of healthy animals by <u>cattle master</u><br><b>2- Control for surveillance:</b><br>a- Detection of infected animals by clinical signs<br>b- Detection of PI animals by PCR & the PI animal should be discarded<br>c- Testing of dams that suffer reproductive failure<br>d- Proper housing of Animals      | a- Detection of infected animals by clinical signs and lab. Tests<br>b- Isolation of infected animals<br>c- Therapeutic application of antibiotics in diseased animals<br>d- Disinfection of place & equipment by <b>per-acetic acid 1%</b><br>e- Bulls that are seropositive must not be used for A.I<br>f- By vaccination: 1- MLV (I/M or I/N)    2- Killed V. Vaccine<br>g- New animals must be isolated for 30 days & examined for infection                                     |

|                                                                                                                                                                                                                                                                                                                                                                                                       |                                                                                                                                                          |
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| <p>e- Examination of semen of bulls before breeding season</p> <p>e- Vaccination of animals &amp; monitoring the formation of Ab titre (<u><i>If it doesn't formed → suspected to be PI</i></u>)</p> <p><u><i>animal &amp; immuno-histo-chemistry should be done for confirmation</i></u>)</p> <p>f –Newly purchased animals should be from uninfected known herds or effectively vaccinated herd</p> | <p>h –Newly purchased animals should be from uninfected known herds or effectively vaccinated herd</p> <p>i –Strict control measures for A.I centers</p> |
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| Type of disease                                                                                                | Sample                                                                                                               | Test                                        | Comment                                                                                                                                            |
|----------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------|---------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------|
| <ul style="list-style-type: none"> <li>• BVD</li> <li>• Hemorrhagic BVD</li> <li>• Sub-clinical BVD</li> </ul> | 1-Paired serum sample<br>2-Buffy coat<br>3-Secretions & excretions<br>4-Spleen, thyroid gland, salivary gland or L.N | ELISA & CFT                                 | <ul style="list-style-type: none"> <li>• Single serum sample is of no value</li> <li>• Tissues should be taken with macroscopic lesions</li> </ul> |
| • PI                                                                                                           | 1- Buffy coat<br>2- Serum                                                                                            | • PCR (+ve) "V. isolation"<br>• SNT (-ve)   | Both <u>must</u> be done                                                                                                                           |
| • Aborted fetus                                                                                                | 1- Thyroid gland<br>2- Salivary gland<br>3- Spleen                                                                   | PCR                                         | Preferred samples                                                                                                                                  |
| • Dam                                                                                                          | Paired serum sample                                                                                                  | SNT & ELISA                                 | Serological response often completed at 4 weeks after abortion time until Ab formed                                                                |
| Calf with congenital anomalies                                                                                 | Single serum sample                                                                                                  | • SNT & ELISA (+ve)<br>• V. isolation (-ve) | Precoloustral serum is preferred                                                                                                                   |



| Items                   | RP                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
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| Syn.                    | Cattle plague                                                                                                                                                                                                                                                                                                                                                                                 | FMD                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| Def.                    | <p>- Acute highly contagious viral disease 1ry of cattle and buffaloes, 2ndry of sheep, goat and swine <b>Ch. by:</b> Fever, diarrhea, dehydration, bran mash ulcers on the animal's gum and death (<u>lesions present in the whole oral cavity</u>)*</p>                                                                                                                                     | <p>- Highly contagious infectious viral disease affects all cloven hoofed animals (Cattle, buffalo, sheep, goat &amp; Pigs) &amp; <b>Ch.by:</b> <u>Vesicles formation</u> in the buccal cavity, coronary band &amp; foot that rupture inside the buccal cavity causing <u>ropy salivation</u></p>                                                                                                                                                                                                                                                                                                                                                                                                 |
| Etiology                | <p>• <b>RNA V. → F. Paramyxoviridae</b></p> <ul style="list-style-type: none"> <li>- The virus is <u>fragile</u></li> <li>- The virus grows on calf kidney cell culture producing <b>INIB &amp; ICIB</b></li> <li>- The virus is antigenically related to PPR V.</li> </ul>                                                                                                                   | <p>• <b>(RNA V.) FMD V. → F. Picornaviridae</b></p> <ul style="list-style-type: none"> <li>- The V. has 7 serotypes → O, A, C, SAT<sub>1</sub>, SAT<sub>2</sub>, SAT<sub>3</sub> &amp; Asia</li> <li>- Each serotype has sub-serotype e.g. O<sub>1</sub> that's antigenically differs from other sub-serotypes &amp; considered as separate disease</li> <li>- <b>In Egypt:</b> There's O<sub>1</sub> &amp; A<sub>22</sub> &amp; <b>Recently</b> SAT<sub>2</sub></li> <li>- The V. lives in <u>frozen meat</u> for up to <u>80 days</u> specially in <b>L.Ns</b> but not in normal meat as <u>normal meat</u> passes <u>rigor mortis &amp; lactic acid formation</u> that kills the V.</li> </ul> |
| ♦Epidemiology           | <p>- The virus presents in blood, "<b>all tissue secretions and excretions</b>" such as: nasal, vaginal, conjunctival discharge and also milk, feces and urine</p>                                                                                                                                                                                                                            | <ul style="list-style-type: none"> <li>- Diseased &amp; carrier animals &amp; those that are in I.P</li> <li>- <b>All secretion &amp; excretions of diseased animals</b> → Saliva due to "<u>vesicular fluid</u>", Milk, Feces, urine &amp; <b>semen</b></li> <li>- All meat tissues &amp; products specially B.M, Viscera, B.I.V "<u>Specially if frozen quickly</u>"</li> </ul>                                                                                                                                                                                                                                                                                                                 |
| 1- Source of Infection  | <p><b>"By direct and indirect contact"</b></p> <ul style="list-style-type: none"> <li>- <b>Direct contact:</b> through m.m by ingestion or inhalation any object contaminated by the virus and this considered as "<i>Major route</i> → <i>the virus is highly invasive</i>"</li> <li>- <b>Indirect contact:</b> through contaminated bedding, equipment and clothes "<i>Rare</i>"</li> </ul> | <p><b>(By direct &amp; indirect contact)</b></p> <ul style="list-style-type: none"> <li>- Inhalation "<u>air-borne disease</u>", Ingestion, by aerosols of infected droplets "<u>Wind-borne disease</u>"</li> <li>- <b>Directly</b> by movement of infected animals</li> <li>- <b>Indirectly</b> through contaminated utensils, vehicles, clothes, inanimate objects &amp; <b>Semen</b></li> </ul>                                                                                                                                                                                                                                                                                                |
| 2- Mode of transmission |                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| 3- Host                 | <ul style="list-style-type: none"> <li>• 1ry → cattle and buffaloes</li> <li>• 2ndry → sheep, goat and swine</li> </ul>                                                                                                                                                                                                                                                                       | <ul style="list-style-type: none"> <li>- All cloven hoofed animals (<b>Cattle, Buffaloes, Sheep, Goat</b>)</li> <li>- <b>Equine</b> has <u>no</u> susceptibility</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |



| 4- Factors affecting susceptibility                                                                                                                                                                                                                                                                                                                                                               |                                                                                                                                                |                                                                                                                                                                                                                      |
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| - All ages, Sexes and breeds are susceptible                                                                                                                                                                                                                                                                                                                                                      |                                                                                                                                                | - <u>Age</u> → Fatality in young (Calves, Kids & Lambs) is higher than adults                                                                                                                                        |
| 1- High morbidity and high mortality                                                                                                                                                                                                                                                                                                                                                              |                                                                                                                                                | 1- Morbidity rate: 100%                                                                                                                                                                                              |
| 2- <u>Peracute form</u> :                                                                                                                                                                                                                                                                                                                                                                         |                                                                                                                                                | 2- Mortality rate: 50 - 70% " <u>In malignant form in calves</u> " & 2% " <u>In adults</u> "                                                                                                                         |
| - Sudden onset                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                                                                | 3- Fever (40 - 41°C) with anorexia & weakness                                                                                                                                                                        |
| - Congestion of visible m.m                                                                                                                                                                                                                                                                                                                                                                       |                                                                                                                                                | 4- Acute painful stomatitis due to vesicle formation in buccal cavity & tongue " <u>Body temp. returns to normal after rupturing of vesicles</u> "                                                                   |
| - Sudden death within 2 days before mucosal erosions develop due to leukopenia                                                                                                                                                                                                                                                                                                                    |                                                                                                                                                | 7- <u>Serous</u> nasal discharge that may become <u>muco-purulent</u>                                                                                                                                                |
| - This form occurs in young calves and exotic animals & death occurs due to cardiogenic shock & electrolyte imbalance                                                                                                                                                                                                                                                                             |                                                                                                                                                | 8- Severe <u>ropy</u> salivation with <u>smacking</u> of lips                                                                                                                                                        |
|                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                                                                                                | 9- Pregnant ♀s may abort with infertility troubles                                                                                                                                                                   |
| 3- <u>Acute form</u> : characterized by <u>4 phases</u>                                                                                                                                                                                                                                                                                                                                           |                                                                                                                                                | 10- <u>The characteristic vesicle</u> :                                                                                                                                                                              |
| (a) <u>Feverish "prodromal" phase</u> → sudden fever, restlessness, depression, shallow rapidbreathing, <u>constipation</u> , cessation of rumination, dry muzzle, congested m.m                                                                                                                                                                                                                  |                                                                                                                                                | a- 1 - 2 cm in diameter                                                                                                                                                                                              |
| (b) <u>Phase of mucous membrane lesions</u> . → occurs after <u>2 - 5days</u> after onset of fever & characterized by raised <u>pin point gray or white</u> foci of necrotic epithelium appear on the m.m of <u>mouth</u> , <u>nose</u> and urogenital tract; these lesions ↑ in size and number and coalesce forming detaching caseous plaques leaving <u>red erosions and peruse salivation</u> |                                                                                                                                                | b- Appear on the m.m of mouth, tongue, udder, teat & coronary band                                                                                                                                                   |
|                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                                                                                                | c- These vesicles are <u>thin-walled</u> & contain <u>straw yellow</u> colored fluid & rupture within <u>24 hrs.</u> leaving a <u>painful raw</u> eroded surface that heals within a week unless 2ndry complications |
|                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                                                                                                | d- Lameness " <u>Complete loss of hoof may occur</u> → <u>Recumbence</u> " → due to gangrene                                                                                                                         |
|                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                                                                                                | e- Vesicles & injuries on udder & teats may predispose mastitis                                                                                                                                                      |
|                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                                                                                                | ■ <u>Sequel of FMD</u> :-                                                                                                                                                                                            |
|                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                                                                                                | 1- <u>Cattle &amp; buffalo</u> :                                                                                                                                                                                     |
|                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                                                                                                | • <u>Panting</u> (V. → endocrine glands e.g. thymus) & the animal appears with long hair, anemia, dyspnea, loss of thermal regulation & occurs mainly after outbreaks & considered as                                |
| Signs                                                                                                                                                                                                                                                                                                                                                                                             | (c) <u>GIT symptoms phase</u> → begins after falling of fever with presence of dark fluid feces with shreds of epithelium and streaks of blood |                                                                                                                                                                                                                      |



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|-----------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                           | <p>(d) <u>Convalescence phase</u> → occurs in surviving animals</p> <p>6- <u>Subacute form</u>: the same as acute form but in <u>lesser degree</u></p> <p>7- <u>Common sequel</u>:</p> <p>a- Destruction of <u>B &amp; T lymphocytes</u> but <u>not</u> memory cells</p> <p>b- Presence of <u>zebra stripping</u> in large intestine due to presence of longitudinal lymphoid aggregations in large intestine</p> <p>c- During P/M in pigs → there's ulcers with diphtheritic membrane</p> <p>d- Activation of 2ndry bacterial infection → other clinical signs may appear leading to <u>misdiagnosis</u></p> | <p><b>chronic syndrome</b></p> <ul style="list-style-type: none"> <li>• Mastitis &amp; abortion (<u>Non-specific abortion due to the systemic state of the body</u>)</li> <li>• Myocardial degeneration in calves</li> <li>• Sloughing of claws (<u>Irritant materials are contraindicated for treatment</u>)</li> </ul> <p>2- <u>Sheep &amp; Goat</u>: Lameness 1<sup>st</sup> then formation of vesicles at buccal cavity</p>                                                    |
| P/M                                                       | <ul style="list-style-type: none"> <li>- Dehydrated carcass with congested m.m</li> <li>- Erosions present among mouth, pharynx, rumen, abomasum, large intestine</li> <li>- <u>Zebra stripping</u> present at the rectal mucosa</li> </ul> <p><u>"Diagnostic"</u></p> <ul style="list-style-type: none"> <li>- Congested <u>payer's patches</u>, lung and heart</li> <li>- Congested and enlarged lymphoid tissues e.g. Spleen</li> </ul>                                                                                                                                                                    | <ul style="list-style-type: none"> <li>- Vesicles, ulcers &amp; erosions are found on the buccal cavity, esophagus, GIT, udder, feet &amp; sometimes trachea &amp; bronchi</li> <li>- Hydro-pericardium with myocarditis &amp; degeneration and necrotic foci "<u>Tiger heart</u>"</li> </ul>                                                                                                                                                                                      |
| <p><b>↓Diagnosis</b></p> <p>1- <u>Field diagnosis</u></p> | <ul style="list-style-type: none"> <li>- Depends on case history (<b>High morbidity &amp; mortality</b>), Clinical signs &amp; P/M</li> </ul> <p><b>•Sample:</b></p> <ol style="list-style-type: none"> <li>1- Blood "<u>at early stage of fever</u>"</li> <li>2- Paired serum samples with 14 days interval</li> <li>3- Gum scraping</li> <li>4- Nasal swab</li> <li>5- L.N, spleen</li> </ol> <p><b>•Tests:-</b></p> <ul style="list-style-type: none"> <li>- Detection of Viral Ag by → <b>AGID "The fastest", CIEP,</b></li> </ul>                                                                        | <ul style="list-style-type: none"> <li>- Depends on case history (<b>High morbidity &amp; mortality in young</b>), Clinical signs &amp; P/M</li> </ul> <p><b>•Sample:</b></p> <ol style="list-style-type: none"> <li>1- Saliva, vesicular fluid &amp; buffy.coat</li> <li>2- Heart, kidney &amp; L.Ns</li> </ol> <p><b>•Tests:</b></p> <ul style="list-style-type: none"> <li>1- Isolation &amp; identification of V. → On BHK<sub>21</sub> and detect changes in cells</li> </ul> |
| 2- <u>Lab. diagnosis</u>                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |



|                                                                                                             |                                                                                                                                                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                 |
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|                                                                                                             | <b>IF, PHA, ELISA</b><br>- Isolation & identification of V. → On <u>Vero cells</u> or <u>bovine kidney cell culture</u> and detect <u>CPE</u> by IF<br>- Detection of Ab by → <b>ELISA</b> or <b>SNT</b><br>- Histopathological examination → for detection Of <u>ICIB</u> & <u>INIB</u> | <b>2-Lab. Animal inoculation:</b><br>a- <u>I/P</u> injection of specimen in <u>baby mice</u> at <u>2 – 7 days</u> → death and detection of V. using <u>known Abs</u> by <u>IFT</u><br>b- <u>I/Dermo</u> – <u>planter</u> injection of specimen in <u>G.Pig</u> → 7 – 8 days later → Vesicle formation without death<br>3- Serology → <b>ELISA, VNT, CFT or FAT</b>                                                              |
| <b>3- Differential diagnosis</b><br>• PPR → affecting goat and sheep respectively and doesn't affect cattle |                                                                                                                                                                                                                                                                                          | • MCF → corneal opacity from periphery to center<br>• RP → High morbidity and high mortality in all animals<br>• IBR → Presence of respiratory cases<br>• CBP & Papular stomatitis → DNA V. <u>while</u> FMD is RNA V.<br>• Bovine mamillitis → Affecting the teats<br>• Foot rot → Offensive odor in the foot region<br>• BEF → No vesicles<br>• Vesicular stomatitis → affects horses<br>• Vesicular exanthema → affects pigs |
| <b>Prognosis</b>                                                                                            | Very bad prognosis                                                                                                                                                                                                                                                                       | - Adult → Favorable      - Neonates → Unfavorable<br>- Recovered cattle are immune to be infected by homologous strain for 4 years<br>- Animal is still susceptible to other FMD Viruses<br>- Abs in colostrum protects the neonates for up to 4 months<br>- Recovered animals are carriers for up to 3 years                                                                                                                   |
| <b>Immunity</b>                                                                                             | - Recovered animal from natural infection have life-long immunity<br>- Abs in colostrum protects young for <u>5 – 6 months</u><br>- No carrier state in few recovered animal                                                                                                             | - <u>Broad spectrum Anti-biotic</u> : Oxytetracycline (1cc / 10Kg, (I/M for 3 successive days)<br>- <u>Anti-inflammatory drug</u> : Fenadryne (1cc / 45 Kg) (I/M for 3 days)<br>- <u>Anti-pyritic</u> : Analgin (7cc / 100Kg)<br>- <u>Astringent &amp; analgesics</u> with cold fomentations → Gentian violet, lidocaine spray, alum 2% or Copper sulphate 5%                                                                   |
| <b>Treatment</b>                                                                                            | No specific treatment                                                                                                                                                                                                                                                                    | • <u>Control of FMD in endemic area:-</u><br>a – Detection of infected animals by clinical signs<br>b · Detection of carrier animals by periodical testing [ <u>CFT</u> ]                                                                                                                                                                                                                                                       |
| <b>Prevention &amp; Control</b>                                                                             | a- Stumping out<br>b- Notifiable disease<br>(N.B/ The disease has been eradicated since 2010)                                                                                                                                                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                 |



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|                         | <p>3- Clinical signs differ according to the organ which the tumors are developed</p> <p>[When <u>superficial L.N</u> is enlarged → it's felt as lump under the skin <u>while</u> if <u>internal L.N</u> is affected → diagnosis becomes <u>more difficult</u>]</p> <p>4- Tumors in <u>abomasum</u> → impaired digestion, persistent diarrhea, chronic bloat &amp; abomasal displacement</p> <p>5- Tumors in <u>right side of the heart</u> → CHF, muffled heart sound, jugular pulsation &amp; edema of brisket</p> <p>6- Neural lymphomatosis → gradual onset of posterior paralysis</p> <p>7- Tumors in <u>L.Ns of retrobulbar aspect of eye</u> → protrusion of eye ball</p> <p>8- Abdominal tumors could be detected by <u>rectal palpation</u></p> | <p>2- Mortality rate → 95 – 100 %</p> <p>3- <u>Peracute "alimentary tract" form:</u></p> <ul style="list-style-type: none"> <li>- High fever</li> <li>- Hemorrhagic gastroenteritis</li> <li>- Severe inflammation in oral and nasal mucosa</li> <li>- Death after 3 - 4 days</li> </ul> <p>4- <u>Typical "head &amp; eye" form:</u></p> <ul style="list-style-type: none"> <li>- Fever (40 – 42°C)</li> <li>- Anorexia and ↓ milk production</li> <li>- Serous nasal and ocular discharge then becomes mucopurulent and purulent</li> <li>- Such discharge may lead to occlusion of nasal cavity leading to dyspnea</li> <li>- Open mouth breathing</li> <li>- Fetid saliva drools from the mouth</li> <li>- Focal necrosis in lips, oral mucosa, tongue, hard and soft palate</li> <li>- Purulent discharge from eyes with photophobia</li> <li>- Corneal opacity <u>from periphery to center</u></li> <li>- Encephalitis that's associated with → tremors, incoordination, torticollis and aggressiveness</li> <li>- Diarrhea, dermatitis &amp; laminitis may occur</li> <li>- <b>Enlargement of L.N**</b></li> </ul> <p>5- <u>Mild form:</u> the same as acute form but in <u>lesser degree</u></p> <ul style="list-style-type: none"> <li>- Emaciated carcass</li> <li>- Enlarged L.Ns</li> <li>- Erosions &amp; ulcers in nasal mucosa, buccal mucosa, mucosa of alimentary tract <u>specially</u> esophagus, rumen &amp; abomasum and also in U.B</li> <li>- Edema, necrosis &amp; cyanosis of tongue and its papillae</li> <li>- Edema &amp; hemorrhage in mucosa of small intestine</li> </ul> |
| <p><b>Signs</b></p>     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| <p><b>P/M</b></p>       | <p>- Firm white tumor masses may be found in any organ commonly: Kidneys, Liver, Spleen, thymus &amp; L.Ns</p> <p>- In adults, right atrium &amp; abomasum are involved</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| <p><b>Diagnosis</b></p> | <p>- Depends on case history, clinical signs &amp; P/M</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |



| Items                               | EBL                                                                                                                                                                                                                                                                                                                                                                                                                                                           | MCF                                                                                                                                                                                                                                                                                                                                                                                                                          |
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| Syn.                                | <ul style="list-style-type: none"> <li>- Bovine Lymphosarcoma</li> <li>- Bovine leukemia virus infection</li> </ul>                                                                                                                                                                                                                                                                                                                                           | <ul style="list-style-type: none"> <li>- Malignant head catarh</li> </ul>                                                                                                                                                                                                                                                                                                                                                    |
| Def.                                | <ul style="list-style-type: none"> <li>- Highly fatal systemic malignant neoplasia of RES of cattle &amp; buffaloes that caused by bovine leukemia V. &amp; <u>characterized by</u>: development of aggregations of neoplastic lymphocytes in any organ</li> </ul>                                                                                                                                                                                            | <ul style="list-style-type: none"> <li>- Acute highly fatal infectious viral disease of cattle, buffalo and deer <u>characterized by</u>:               <ul style="list-style-type: none"> <li>- Erosive stomatitis</li> <li>- Corneal opacity</li> <li>- Culaneous exanthema</li> <li>- Gastroenteritis</li> <li>- Kerato-conjunctivitis</li> <li>- Enlargement of L.N</li> </ul> </li> </ul>                               |
| Etiology                            | <ul style="list-style-type: none"> <li>• BLV → F. Retroviridae</li> <li>- The virus grows on spleen cell culture with formation of cytopathic effect Syncytia formation in the lymphocytes</li> <li>- <b>Destroyed</b> by pasteurization</li> </ul>                                                                                                                                                                                                           | <ul style="list-style-type: none"> <li>• DNA V. → F, Herpesviridae</li> <li>- The Virus is Lymphotropic virus → attacks lymphoid tissue</li> </ul>                                                                                                                                                                                                                                                                           |
| ♦ <u>Epidemiology</u>               |                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                                                                                                                                                                                              |
| 1- Source of Infection              | <ul style="list-style-type: none"> <li>- Infected animal &amp; Carriers animals "<u>any infected animal</u> → <u>carrier</u>"</li> </ul>                                                                                                                                                                                                                                                                                                                      | <ul style="list-style-type: none"> <li>- Clinically normal sheep</li> <li>- Wildebeest</li> </ul>                                                                                                                                                                                                                                                                                                                            |
| 2- Mode of transmission             | <ul style="list-style-type: none"> <li>- <u>Horizontal</u>:               <ul style="list-style-type: none"> <li>• By blood contaminated needles</li> <li>• Equipment for ear tagging, castration &amp; surgeries</li> <li>• Blood sucking insects</li> <li>• Close contact between infected animals &amp; healthy animals</li> </ul> </li> <li>- <u>Vertically</u>: through milk &amp; colostrum or Intra-uterine</li> <li>- Cattle and buffaloes</li> </ul> | <ul style="list-style-type: none"> <li>- <i>In sheep-associated MCF</i> → unknown and may be by ingestion or by blood transfusion</li> <li>- <i>In wildebeest-associated MCF</i> → by inhalation, ingestion of contaminated food by the nasal or ocular discharge of such wildebeest</li> <li>- Spreading by direct contact doesn't occur</li> <li>- Cattle, buffaloes and deer (<u>Cattle are dead-end host</u>)</li> </ul> |
| 3- Host                             | <ul style="list-style-type: none"> <li>- Cattle and buffaloes</li> <li>- <b>Age</b> → It occurs rarely in animals less than <u>2 years</u> &amp; it ↑ by ↑ age specially in dairy herds (<u>3 — 8 years</u>) comparing to beef herds</li> <li>- Low hygienic environment &amp; Seasons play a role in ↑ incidence of disease</li> </ul>                                                                                                                       | <ul style="list-style-type: none"> <li>- <b>Age</b> → the disease rarely observed over 4 years of age</li> </ul>                                                                                                                                                                                                                                                                                                             |
| 4- Factors affecting susceptibility | <ul style="list-style-type: none"> <li>- 1- IP: 4 — 5 years</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                        | <ul style="list-style-type: none"> <li>- 1- Morbidity rate → <u>sporadically</u> "but in case of outbreak may reach <u>50%</u>"</li> </ul>                                                                                                                                                                                                                                                                                   |
| ns                                  | 2- <u>Sporadic</u>                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                              |



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|                         | <p>3- Clinical signs differ according to the organ which the tumors are developed</p> <p>[When <u>superficial L.N</u> is enlarged → it's felt as lump under the skin <u>while</u> if <u>internal L.N</u> is affected → diagnosis becomes <u>more difficult</u>]</p> <p>4- Tumors in <u>abomasum</u> → impaired digestion, persistent diarrhea, chronic bloat &amp; abomasal displacement</p> <p>5- Tumors in <u>right side of the heart</u> → CHF, muffled heart sound, jugular pulsation &amp; edema of brisket</p> <p>6- Neural lymphomatosis → gradual onset of posterior paralysis</p> <p>7- Tumors in <u>L.Ns of retrobulbar aspect of eye</u> → protrusion of eye ball</p> <p>8- Abdominal tumors could be detected by <u>rectal palpation</u></p> | <p>2- Mortality rate → 95 – 100 %</p> <p>3- Peracute "alimentary tract" form:</p> <ul style="list-style-type: none"> <li>- High fever</li> <li>- Hemorrhagic gastroenteritis</li> <li>- Severe inflammation in oral and nasal mucosa</li> <li>- Death after 3 - 4 days</li> </ul> <p>4- Typical "head &amp; eye" form:</p> <ul style="list-style-type: none"> <li>- Fever (40 – 42°C)</li> <li>- Anorexia and 1 milk production</li> <li>- Serous nasal and ocular discharge then becomes mucopurulent and purulent</li> <li>- Such discharge may lead to occlusion of nasal cavity leading to dyspnea</li> <li>- Open mouth breathing</li> <li>- Felid saliva drools from the mouth</li> <li>- Focal necrosis in lips, oral mucosa, tongue, hard and soft palate</li> <li>- Purulent discharge from eyes with photophobia</li> <li>- Corneal opacity <u>from periphery to center</u></li> <li>- Encephalitis that's associated with → tremors, incoordination, torticollis and aggressiveness</li> <li>- Diarrhea, dermatitis &amp; laminitis may occur</li> <li>- <b>Enlargement of L.N**</b></li> </ul> <p>5- <u>Mild form</u>: the same as acute form but in <u>lesser degree</u></p> <ul style="list-style-type: none"> <li>- Emaciated carcass</li> <li>- Enlarged L.Ns</li> <li>- Erosions &amp; ulcers in nasal mucosa, buccal mucosa, mucosa of alimentary tract <u>specially</u> esophagus, rumen &amp; abomasum and also in U.B</li> <li>- Edema, necrosis &amp; cyanosis of tongue and its papillae</li> <li>- Edema &amp; hemorrhage in mucosa of small intestine</li> </ul> |
| <p><b>Signs</b></p>     | <p>P/M</p> <ul style="list-style-type: none"> <li>- Firm white tumor masses may be found in any organ commonly: Kidneys, Liver, Spleen, thymus &amp; L.Ns</li> <li>- In adults, right atrium &amp; abomasum are involved</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | <p>1- Depends on case history, clinical signs &amp; P/M</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| <p><b>Diagnosis</b></p> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | <p>1- Depends on case history (contact with sheep &amp; goat or</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |



|                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | wildbeest with sporadic incidence), Clinical signs & P/M                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|---------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 2- Lab. diagnosis         | <p><b>•Tests:-</b></p> <ul style="list-style-type: none"> <li>- Detection of Viral Ag &amp; Ab by → AGID <u>"The best"</u>, IF, PHA, ELISA or PCR</li> <li>- Isolation &amp; identification of V. → On Vero cells or Spleen cell culture and detect CPE by IF</li> <li>- Detection of Persistent lymphocytosis → ↑ in the absolute lymphocyte count of 3 or 4 times above the normal count &amp; persist for 3 months → 20000 – 30000 / <math>\mu</math>l of blood</li> <li>- Histopathological examination → for detection of <u>Lymphosarcoma</u></li> </ul> <p><b>♦AGID:</b></p> <ul style="list-style-type: none"> <li>1- If +ve in animal more than 6 months → discarded</li> <li>2- If +ve in animal less than 6 months → retained until 6 months &amp; then retested</li> <li>- If +ve → discarded</li> <li>- If -ve → returned to herd</li> </ul> | <p><b>♦Sample:-</b></p> <ul style="list-style-type: none"> <li>1- Blood</li> <li>2- paired serum samples</li> <li>3- L.N, spleen</li> <li>4- Liver, Lung &amp; Kidney</li> </ul> <p><b>•Tests:-</b></p> <ul style="list-style-type: none"> <li><u>Isolation &amp; identification of V.</u> → On Vero cells or bovine kidney cell culture and detect CPE by IF</li> <li><u>Detection of Viral Ag</u> by → AGID, CIEP, IF, PHA, ELISA</li> <li><u>Detection of Ab</u> by → ELISA or SNT</li> <li><u>Histopathological examination</u> → for detection of extensive disseminated vasculitis &amp; perivascularitis in spleen &amp; L.N</li> </ul> |
| 3- Differential diagnosis | <ul style="list-style-type: none"> <li>•T.B → Tuberculin test</li> <li>•John's disease → Johnin test</li> <li>•Rabies → shorter course &amp; detection of Negri bodies</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | <ul style="list-style-type: none"> <li>•BVD → Corneal opacity from center to periphery</li> <li>•RP → High morbidity &amp; high mortality</li> <li>•IBR → lesions restricted to upper respiratory tract, not fatal, rapid spread &amp; rapid recovery</li> <li>•Pneumonic pasteurellosis → responds to treatment with antibiotics</li> </ul>                                                                                                                                                                                                                                                                                                   |
| Prognosis                 | - No specific treatment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Bad                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| Treatment                 | <ul style="list-style-type: none"> <li>- Valuable animals could be kept by supportive treatment &amp; fluid therapy &amp; surgeries (<i>Pregnant ♀ may be delivered by C-section but BLV infection should be taken in consideration</i>)</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | - Symptomatic treatment of little value                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |



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|                      | <p>a - Detection of infected animals by clinical signs</p> <p>b - Confirmation by PCR</p> <p>c - Isolation of infected animals</p> <p>d - Disinfection by <u>Chlorine</u></p> <p>e - Hygienic measures → single syringe use, electric dehorning &amp; castration</p> <p>f - Testing &amp; slaughter <u>or</u> testing &amp; segregation to prevent vertical &amp; horizontal spread</p> <p>g - Stamping out in <u>exotic areas</u> *****</p> <p>h - Serological testing using <u>AGID</u> "From Lab. Diagnosis"</p> <p>i - Avoid vertical transmission:</p> <ul style="list-style-type: none"> <li>• Culling of +ve dams</li> <li>• Feeding of calves on colostrum only from BLV -ve cows</li> <li>• Pasteurization &amp; freezing of +ve milk (<u>If necessary</u>)</li> <li>• Milk replacer system</li> </ul> <p>j - Avoid horizontal transmission:</p> <ul style="list-style-type: none"> <li>• Insect control</li> <li>• Using single needle instrument</li> </ul> <p>k - By vaccination "<u>Give short protection</u>"</p> <p>l - New animals must be isolated &amp; tested for infection</p> <p>m - Newly purchased animals should be from uninfected known herds or effectively vaccinated herd</p> |
| Prevention & Control | <p>a - Newly purchased animals should be kept in quarantine for 14 days before entering the farm specially in <u>free areas</u></p> <p>b - Periodical testing of animals inside the farms to detect any diseased animal</p> <p>c - Restrict the movement of both animals and fresh animal products</p> <p>d - Infected premises should be disinfected</p> <p>e - Separation between diseased &amp; healthy animals</p> <p>f - Susceptible Spp. Should be separated from ovine &amp; wildebeest</p> <p>g - quarantine measures should be established at airports</p> <p>h - quarantine measures for all unprocessed animal products and susceptible live host</p> <p>i - biosecurity measures should be established inside farms</p> <p>• <u>N.B/</u> There's no vaccine available for protection of animals</p>                                                                                                                                                                                                                                                                                                                                                                                            |



| Items                               | AKA                                                                                                                                                                                                                                                                                                                         |  | BSE                                                                                                                                                                                                                                                                                                   |  |
|-------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
| Syn.                                | <ul style="list-style-type: none"> <li>- Epizootic abortion arthrogryposis</li> <li>- Hydranecephaly syndrome</li> </ul>                                                                                                                                                                                                    |  | <ul style="list-style-type: none"> <li>- Mad cow disease</li> <li>- Scrapie disease in sheep</li> </ul>                                                                                                                                                                                               |  |
| Def.                                | <ul style="list-style-type: none"> <li>- Infectious seasonal arthropod borne teratogenic viral infection of ruminants <u>Ch. Only by:</u></li> <li>- Abortion</li> <li>- Congenital anomalies</li> </ul>                                                                                                                    |  | <ul style="list-style-type: none"> <li>- Sporadic sub-acute afebrile fatal infectious disease of adult cattle caused by scrapie-like infectious agent &amp; Ch. By:</li> <li>- Long IP</li> <li>- Progressive neurological fatal signs</li> <li>- The disease has public health importance</li> </ul> |  |
| Etiology                            | <ul style="list-style-type: none"> <li>1- Akabane V. → F. Bunyavirida</li> <li>2- Aino V. → F. Bunyavirida</li> <li>- The Virus is enveloped &amp; killed Lipid solvents</li> </ul>                                                                                                                                         |  | <ul style="list-style-type: none"> <li>• Prion</li> <li>- Minute, Pretentious infectious material that's not immunogenic because of its low molecular weight</li> <li>- It's resistant to procedures that hydrolyze nucleic acid</li> <li>- It resists all the procedures that kill any V.</li> </ul> |  |
| ♦Epidemiology                       |                                                                                                                                                                                                                                                                                                                             |  |                                                                                                                                                                                                                                                                                                       |  |
| 1- Source of Infection              | <ul style="list-style-type: none"> <li>- Mosquitoes &amp; Genus culicoids</li> </ul>                                                                                                                                                                                                                                        |  | <ul style="list-style-type: none"> <li>- Meat &amp; Bone meal that derived from Animals infected with Scrapie</li> <li>- Specific bovine offal, Lymphatic &amp; Nervous tissues</li> </ul>                                                                                                            |  |
| 2- Mode of transmission             | <ul style="list-style-type: none"> <li>- Biologically by biting of arthropod (with ↑ in No. &amp; change in shape)</li> </ul>                                                                                                                                                                                               |  | <ul style="list-style-type: none"> <li>- Ingestion of Meat &amp; Bone meal that derived from Animals infected with Scrapie</li> <li>- Ingestion of Specific bovine offal, Lymphatic &amp; Nervous tissues</li> </ul>                                                                                  |  |
| 3- Host                             | <ul style="list-style-type: none"> <li>- Cattle, ewes and goats "Clinically"</li> <li>- Buffaloes, camels &amp; horses (Have the Abs of AKA disease in their blood <i>without</i> clinical signs)</li> <li>- Season → AKA occurs for <u>2 – 3 months</u> in the year during the season of high insects' activity</li> </ul> |  | <ul style="list-style-type: none"> <li>- Natural infection occurs in Cattle</li> <li>- Human is a host (Zoonotic disease)</li> </ul>                                                                                                                                                                  |  |
| 4- Factors affecting susceptibility |                                                                                                                                                                                                                                                                                                                             |  |                                                                                                                                                                                                                                                                                                       |  |
| Signs                               | <ul style="list-style-type: none"> <li>1- The only clinical sign in adult cow is abortion</li> <li>2- In animals born alive, signs include Inco-ordination &amp;/or mild arthrogryposis</li> </ul>                                                                                                                          |  | <ul style="list-style-type: none"> <li>- Age → High incidence at 4 – 5 years of age</li> </ul>                                                                                                                                                                                                        |  |
|                                     |                                                                                                                                                                                                                                                                                                                             |  | <ul style="list-style-type: none"> <li>1- IP: 2 – 8 years</li> <li>2- Low morbidity</li> <li>3- Mortality rate is <u>100%</u></li> <li>4- Course: 1 – 6 months</li> <li>5- Changes in mental state as: apprehension, temperamental changes &amp; abnormal behavior</li> </ul>                         |  |



(Deficiency of cerebral cortex & of intelligence while in BVD, cerebellar agenesis occurs)

## Signs

N.B/

1- **Post-Hydraencephaly group** → unable to stand with thickened dorsal cranial bones & Hydraencephaly involves anterior & mid-brain

2- **Arthrogryposis** → complete absence of ventral horn cells of spinal cord with neurotropic failure of Mm. development & Contracture of joints

P/M

- In animals with arthrogryposis → Severe Mm. atrophy, Fixation of joints by tendon contracture, Normal articular surfaces & Easily released joints  
- In animals with Hydraencephaly → cerebral hemispheres are absent & replaced by fluid & enclosed by normal meninges

## 1- Field diagnosis

- Depends on case history, Clinical signs & P/M

• Sample → Placenta, Fetal fluids, fetal membranes, Fetal Mm., Blood & paired serum samples

N.B/

1- The most 2 important samples are → Fetal fluids & Fetal membranes (VIP)

2- Live fetus could be used in diagnosis as it already has the V. (VIP)

## 2- Lab. diagnosis

0- Abnormal ear position & Frenzy

7- The appetite may be normal

8- Changes in sensation as: Hyperesthesia to both touch & sound, excessive licking & head **Shyness**

9- Loss of body condition & ↓ milk yield

10- Recumbence & Death

N.B/

1- The disease has long IP sq, for the disease to occur ingestion must be for a long time

2- The disease doesn't transmit vertically

3- The disease doesn't transmit through udder, colostrum, milk semen, urine, feces & skin

4- Appearance of scrapie disease in England → The disease transmit vertically & horizontally → the animals were slaughtered & used as meat meal & bone meal → until occurrence of the disease for the 1<sup>st</sup> time at November 1986

- No abnormalities

- Depends on case history & Clinical signs

• Sample → Whole brain or part of brain (Pons or MO)

• Histopathology → bilateral symmetric intra-cytoplasmic vacuolation of neurons & gray matter

N.B/ There's no lab. Tests to identify infected cattle before the onset of clinical signs, the only way for diagnosis is Histopathology



|                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|-----------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                         | <p><b>Diagnosis:</b></p> <ol style="list-style-type: none"> <li>1- Isolation &amp; identification of V. → By I/C inoculation of sample in suckling mice &amp; in cell cultures then the V. identified by IF</li> <li>2- Detection of Ab by → HI, SNT, CFT <u>or</u> AGID</li> <li>• <u>N.B/</u> Demonstration of specific Ab in Precolostrum neonatal or fetal sera or serum of dam is diagnostic &amp; indicate utero AKA V. infection</li> </ol>                                                                                                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| <p><b>3- Differential diagnosis</b></p> | <ul style="list-style-type: none"> <li>• RVF → affects sheep &amp; goat causing <u>acute liver failure</u></li> <li>• BT → cyanosis of tongue with affections in the coronary band</li> <li>• BVD → causing diarrhea with oral lesions <u>while</u> AKA causes Hydraencephaly</li> </ul>                                                                                                                                                                                                                                                                                            | <ul style="list-style-type: none"> <li>• Hypomagnesaemic tetany → Low Mg level in blood</li> <li>• Nervous form of Ketosis → High level of ketone bodies in blood &amp; acetone odor from mouth</li> <li>• Nervous form of milk fever → Low level of Ca in blood</li> <li>• Rabies → Presence of Negri's bodies in brain cells</li> <li>• Lead poisoning → Presence of Blue line on gum.</li> <li>• Listeriosis → Detection of M.O (<u>L.monocytogenes</u>), Unilateral facial paralysis</li> </ul> |
| <p><b>Prognosis</b></p>                 | <p>- The dam has got long-life immunity after the infection</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | <p><b>Bad</b></p> <p>- No immunity develop because the causative agent of the disease is not immunogenic</p>                                                                                                                                                                                                                                                                                                                                                                                        |
| <p><b>Immunity</b></p>                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| <p><b>Treatment</b></p>                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| <p><b>Prevention &amp; Control</b></p>  | <ol style="list-style-type: none"> <li>a- Detection of infected animals by clinical signs (<u>abortion or teratogenesis</u>)</li> <li>b -Isolation of infected animals</li> <li>c -Controlling of <u>arthropods</u> by larvicides &amp; insecticides</li> <li>d -Disinfection of place &amp; equipment by preventing manure contamination of food &amp; water</li> <li>e -Proper housing of Animals</li> <li>f -Newly purchased animals should be from uninfected known herds or effectively vaccinated herd</li> <li>g- Increase the immunity of animals by vaccination</li> </ol> | <p><b>No treatment</b></p> <p><b>(a) In endemic areas:</b></p> <ol style="list-style-type: none"> <li>1- Notifiable Disease</li> <li>2- Detection of infected animals by clinical signs &amp; Histopathological examination</li> <li>3 -Isolation of infected animals</li> <li>4 -Proper housing of Animals</li> <li>5 -Feeding cattle on meat meal or bone meal of unknown origin must be prohibited</li> <li>6- Slaughter programs should be established for all susceptible cases</li> </ol>     |



**Inactivated Vaccine & Live attenuated vaccine:**

- **Advantages:** Safe for pregnancy & protect the animals in endemic areas
- **Booster dose:** before season of high insects' activity (wet warm seasons)

1- Any drugs derived from bovine sources must not be obtained from countries with **BSE**

8- Ban Should be placed on use of milk (**Although milk is not incriminated in transmission**)

9- Newly purchased animals should be from uninfected known herds

10- Any feed stuff enter the farm should be from known origin

11- Specific bovine offal should (**Brain, Spinal cord, Tonsils, Spleen & Intestines**) and their by-products should be prohibited for use in human specially that come from cattle over 6 months

**(b) In free areas:**

1- Strict prohibition of importation of live cattle & their products from countries with disease

2- Complete ban on feeding of all ruminants' protein to other ruminants

3- Examination of cattle's brain with progressive neurological signs by histopathology

4- Because of long IP, quarantine is of low value otherwise it should be applied for 3 years

5- Framers & Veterinarians should be aware of clinical signs & must notify the authorities

| Items                                                 | BEF                                                                                                                                                                                                                                                                                                                                                                                                    | LSD                                                                                                                                                                                                                                                                                                                                                                                                                                             | CBP                                                                                                                                                                                                                                                                          |
|-------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Syn.                                                  | 3 – day sickness - stiff sickness                                                                                                                                                                                                                                                                                                                                                                      | Pseudo-urticaria                                                                                                                                                                                                                                                                                                                                                                                                                                | Small pox - True Pox                                                                                                                                                                                                                                                         |
| Def.                                                  | <ul style="list-style-type: none"> <li>- Acute infectious viral disease of cattle &amp; buffaloes; transmitted by <u>insects and characterized by:</u></li> <li>- Sudden onset</li> <li>- Transient fluctuating fever</li> <li>- Stiffness &amp; lameness</li> <li>- Enlargement of peripheral L.Ns</li> <li>- Short course &amp; rapid recovery</li> <li>- Marked drop in milk yield (80%)</li> </ul> | <ul style="list-style-type: none"> <li>- Acute infectious viral serious skin disease of cattle, caused by neethling V., transmitted by <u>insects &amp; characterized by:</u></li> <li>- Fever</li> <li>- Sudden appearance of nodules on all parts of skin</li> <li>- Lymphadenitis</li> <li>- Edema of leg &amp; brisket</li> </ul>                                                                                                           | <p>Benign, contagious viral disease of cattle, buffaloes &amp; human that's <u>characterized by:</u> development of <u>pox</u> lesions on the teats, udder &amp; perineum &amp; on <u>or</u> around lips and muzzle of suckling calves</p>                                   |
| Etiology                                              | • BEF V. " <u>RNA V.</u> " → F. Rhabdoviridae                                                                                                                                                                                                                                                                                                                                                          | <ul style="list-style-type: none"> <li>• Neethling V. "<u>DS DNA V.</u>" → G. Capripox V. → F. Poxviridae</li> <li>- The virus affects <u>cattle only</u> &amp; rarely buffaloes causing <u>LSD</u> "<u>Malignant pox of cattle</u>"</li> <li>- The virus antigenically related to sheep &amp; goat pox V.</li> <li>- The virus causes CPE → <u>ICIB</u></li> <li>- The virus survives in dried scabs &amp; salted hides for 33 days</li> </ul> | • CBP V. " <u>DNA V.</u> " → G. orthopox V. → F. Poxviridae                                                                                                                                                                                                                  |
| <b>➤Epidemiology</b><br><b>1- Source of Infection</b> | <ul style="list-style-type: none"> <li>- Infected Mosquitoes &amp; culicoids</li> <li>- Infected animal where V. present in blood for <b>5 days</b></li> </ul>                                                                                                                                                                                                                                         | <ul style="list-style-type: none"> <li>- Insects "<u>Stomoxys, Musca spp. &amp; Tabans</u>"</li> <li>- Infected Animal "<u>in discharge, scabs, saliva, semen &amp; blood</u>"</li> <li>- By biting of insects that can transmit it <u>mechanically</u></li> </ul>                                                                                                                                                                              | <ul style="list-style-type: none"> <li>- Infected cattle</li> <li>- Infected milkers</li> <li>- Contaminated milker's hands</li> <li>- Vaccinated milkers</li> </ul>                                                                                                         |
| <b>2- Mode of transmission</b>                        | <ul style="list-style-type: none"> <li>- Insects' biting</li> <li>- By <u>IV</u> injection of 0.002 ml of blood containing V.</li> <li>- It's not transmitted neither by direct <b>contact</b> nor <b>semen</b></li> </ul>                                                                                                                                                                             | <ul style="list-style-type: none"> <li>- By direct contact at the 1<sup>st</sup> 2 – 3 days of infection</li> </ul>                                                                                                                                                                                                                                                                                                                             | <ul style="list-style-type: none"> <li>• <b>By direct &amp; indirect contact:</b></li> <li>a- Contact with infected cattle</li> <li>b- Biting of insects</li> <li>c- During milking process by contaminated milkers' hands</li> <li>d- Suckling from infected dam</li> </ul> |



| 3- Most                             | - Cattle and buffaloes                                                                                                                                                                                                                                                                                                 | - Cattle → the <u>only</u> host of the disease                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | - Cattle, buffaloes & Human                                                                                                                                                                                                                                                                                                   |
|-------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 4- Factors affecting susceptibility | <p>a- Age → At 6 – 24 months &amp; calves less than 6 months are not susceptible</p> <p>b- Season → The disease occurs in summer season</p> <p>c- Condition → High producing animals are more susceptible than low producing animals</p>                                                                               | <p>a- Young ages are more susceptible showing typical signs and high mortalities</p> <p>b- Season → LSD ↑ in seasons of high insects' activity "<u>summer</u>"</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                 | <p>- Sex → ♀ are most susceptible</p> <p>- Age → Calves are severely affected</p>                                                                                                                                                                                                                                             |
| 5- Economic importance              | <p>a- Marked drop in milk yield (Up to 80%)</p> <p>b- Temporary sterility of bulls (Up to 6 months)</p> <p>c- Recumbent cases may suffer mastitis</p> <p>d- Restriction on importation of live animals</p> <p>e- Death due to infection (Man-made death)</p>                                                           | <p>a- Progressive debilitating disease due to long course causing emaciation, infertility &amp; abortion</p> <p>b- ↓ Milk production</p> <p>c- Damage to the hides</p>                                                                                                                                                                                                                                                                                                                                                                                                                                             | <p>a- Loss of milk production</p> <p>b- Predisposes to mastitis</p>                                                                                                                                                                                                                                                           |
| Signs                               | <p>1- IP: 2 – 4 days</p> <p>2- Mortality rate: 1% (Man-made)</p> <p>3- Course: 3 – 5 days</p> <p>4- The most characteristic dramatic sign of the disease is → <b>Sudden onset &amp; recovery</b></p> <p>5- Fever (40.5 – 41° C), Anorexia, Sudden drop in milk yield</p> <p>6- Weakness, Shivering &amp; stiffness</p> | <p>1- <b>High</b> morbidity &amp; <b>low</b> mortality</p> <p>2- <u>Course</u>: 5 - 7 wks. "<u>Long</u>"</p> <p>3- Fever (40 - 41.5°C) → Persists up to 14 days &amp; usually <u>diphasic</u></p> <p>4- After the beginning of the 2<sup>nd</sup> phase of fever → Skin lesions appear all over the body specially: <b>Perineum, Udder &amp; Genitalia</b></p> <p>5- Lesions "<u>Lumps</u>" → Intradermal, firm, raised, circumscribed &amp; has a diameter of 0.5 – 5 cm with erected hair</p> <p>6- Salivation, ocular &amp; nasal discharge <u>due to</u> white flat or raised foci &amp; erosions in m.m.s</p> | <p>1- <u>High</u> morbidity &amp; <u>low</u> mortality</p> <p>2- Fever may be present <u>or</u> not</p> <p>3- Typical pox lesions could be observed → Macule, Papule, Vesicle, Pustule &amp; Scab formation at teats, udder, perineum &amp; inner thigh</p> <p>4- Suckling calves may develop lesions around their mouths</p> |



|                                                                                                  |                                                                                                                                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |  |  |
|--------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|--|
|                                                                                                  |                                                                                                                                                                           | 1- Nutritional stasis & uraia<br>8- Paralysis of tongue<br>9- Loss of swallowing reflex<br>10- Recumbence for 12 – 24 hrs.                                                                                                                                                                                                                                                                                                                                                                                         |  |  |
| Sequel                                                                                           | 1- Fatal pulmonary edema & emphysema<br>2- Mastitis, Abortion & Pneumonia<br>3- Temporary infertility in Bulls<br>4- Prolonged lameness & Recumbence                      | 1- Lesions then may disappear <u>or</u> <b>Indurated</b> <u>or</u> persist with necrosis and sloughing leaving large open sores ( <b>Sit-fast</b> )<br>→ dry scabs develops 2 – 3 wks. later & complicated by pyogenic M.O<br>8- Persistent painful edema in one or more limbs, genitalia, brisket & head with <b>lymphadenitis</b><br>9- Snoring respiratory sound with obstruction of respiratory passage → <b>death</b><br>10- Pregnant ♀ may abort with skin lesions on the fetus " <b>Specific abortion</b> " |  |  |
|                                                                                                  | - Joints may have excess fluid & fibrin<br>- L.N may be swollen, edematous & have petechial hemorrhage<br>- Serofibrinous synovitis, pleurisy, pericarditis & peritonitis | <b>Complications:</b><br>1- Lameness & diarrhea<br>2- Anestrus in ♀ & Infertility in ♂ for 4 – 6 months<br>3- Fatal pneumonia → due to formation of nodules in trachea<br>- Cutaneous nodules affects skin & extends to internal organs as: Pharynx, Larynx, trachea, Lung, GIT, Uterine wall & Muscles<br>- Soft grayish yellow ulcerated necrotic masses could be found                                                                                                                                          |  |  |
| P/M                                                                                              |                                                                                                                                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |  |  |
| <b>Diagnosis</b><br>1- Field diagnosis                                                           |                                                                                                                                                                           | (LSD → Neither antibiotic nor chemotherapeutics affect the course of disease & Rapid spread in cattle only in summer)<br>- Depends on case history, Clinical signs & P/M                                                                                                                                                                                                                                                                                                                                           |  |  |
| <b>Sample:</b><br>1- Blood<br>2- Paired serum sample                                             |                                                                                                                                                                           | <b>Sample:-</b><br>a- Scabs & nodules "preferred for all pox V."<br>b- Nodules & L.N<br>c- For serology → Paired Serum sample<br>d- Whole blood                                                                                                                                                                                                                                                                                                                                                                    |  |  |
| <b>Tests:</b><br>1- Isolation & identification of V. → On BHK <sub>21</sub> and detect CPE by IF |                                                                                                                                                                           | <b>Tests:</b><br>1- Detection of Ag by → <u>E/M Examination</u>                                                                                                                                                                                                                                                                                                                                                                                                                                                    |  |  |



|                           |                                                                                                                                                                                                                                                                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                                                                                                                                                                                     |
|---------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 2- Lab. diagnosis         | 3- Hematology → neutrophilia<br>4- Lab animal inoculation → I/M in suckling mice                                                                                                                                                                                                   | <b>Tests:-</b><br>1- Isolation & identification of V. on <u>CAM</u> of <u>ECE &amp; Vero cells</u> and detect <u>CPE</u> → <u>ICIB</u><br>2- Detection of Ag by → <u>VNT</u> , <u>CFT</u> or <u>FAT</u><br>3- Detection of Ab by → <u>SNT</u> , <u>CFT</u> or <u>ELISA</u><br>4- Histopathology → Detection of <u>ICIB</u> & some specific cells surrounding the lesion as: <u>Histiocytes</u> , <u>Neutrophils</u> & <u>Plasma cells</u>                                                                                                                        | 2- Isolation & identification of V. → On <u>CAM</u> or <u>vero cells</u> and detect <u>CPE</u> & <u>ICIB</u><br>3- Detection of Ab by → <u>ELISA</u> & <u>CFT</u><br>4- Histopathology by → presence of <u>ICIB</u> |
| 3- Differential diagnosis | • <b>FMD</b> → Presence of vesicles in oral cavity while in <b>BEF</b> there's no vesicles<br>• <b>Milk fever</b> → Characteristic recumbence with head reflected toward flank region with low <b>Ca</b> level in the blood so the animal responds to treatment with <b>Ca</b>     | a- <u>Mycotic dermatitis</u> → Self-limiting disease, Ch. By brownish grey hard scabs that are 2.5 cm in diameter & 1.2 cm in thickness<br>b- <u>Mange</u> → Mite detected under microscope<br>c- <u>Photosensitization</u> → Photophobia & Cutaneous necrosis in non-pigmented skin<br>d- <u>CBP</u> → Papule, Vesicle, Pustule, Ulcer & Scab<br>e- <u>Ulcerative Lymphangitis</u> → S/C swelling & thickening of skin and the M.O could be isolated<br>"Cornebacterium pseudotuberculosis"<br>f- <u>Urticaria</u> → Wheel-like swelling that disappear rapidly | الجول<br>↓                                                                                                                                                                                                          |
| Prognosis                 | - <b>Good Prognosis</b><br>- <b>Bad prognosis</b> → In case of S/C emphysema<br>a- Complete rest & Good nursing.<br>b- <b>Broad Spectrum antibiotics</b> → <b>Oxytetracycline</b> (1cc / 10 Kg) (I/M For 3 days)<br>c- <b>Anti-inflammatory</b> → <b>Fynadine</b> (1cc / 45Kg) I/M | - Adults → favorable<br>- Young calves → unfavorable                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Favorable                                                                                                                                                                                                           |
| Treatment                 |                                                                                                                                                                                                                                                                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                                                                                                                                                                                     |



|                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                                                                                                                                                                                                                                                                                                             |
|---------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Treatment</b>                | <p>d- <b>Anti-pyretic</b> → Analgin (7cc/100kg) →</p> <p>e- Ca borogluconate (I/V infusion) → 500 - 1000 ml (For hypocalcaemia) [Slow injection]</p> <p>f- Per OS administration of drugs is contraindicated</p>                                                                                                                                                                                                                                                                                                                                                                                         | <p>→</p> <ul style="list-style-type: none"> <li>• <u>Hygienic treatment:</u></li> <li>• Good nursing care.</li> <li>• Protection of animal from sunlight</li> <li>• <u>Supportive treatment:</u> Fluid therapy as: I/V dextrose 25%</li> <li>• After recovery → <b>Long-life immunity</b></li> <li>• Calves from recovered ♀ → resist the disease for 6 months</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | <ul style="list-style-type: none"> <li>- Application of soft emollient cream <b>before</b> milking &amp; astringent lotion <b>after</b> milking</li> <li>- Broad spectrum antibiotic sprays or ointments [contraindicated to use corticosteroids]</li> </ul>                                                                                                                                                                |
| <b>Immunity</b>                 | <ul style="list-style-type: none"> <li>- Solid immunity against homologous strains for a period up to 2 years</li> <li>- Transient infection (without clinical signs) doesn't produce any immunity</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | <ul style="list-style-type: none"> <li>- Recovered animals resist infection</li> </ul>                                                                                                                                                                                                                                                                                                                                      |
| <b>Prevention &amp; Control</b> | <p>a- <b>Detection of infected animals by clinical signs &amp; lab. tests</b></p> <p>b- Isolation of infected animals</p> <p>c- <b>Proper housing of Animals</b></p> <p>d- Disinfection of place &amp; equipment by preventing manure contamination of food &amp; water</p> <p>e- <b>Vector control</b> (Using larvicides &amp; insecticides) **</p> <p>f- New animals must be isolated for 30 days &amp; examined for persistent infection</p> <p>g- Newly purchased animals should be from uninfected known herds or effectively vaccinated herd</p> <p>h- <b>Increase the immunity of animals</b></p> | <p>1- <b>In Free countries:</b></p> <p>a- The direct or indirect import or Transit from countries with LSD of all domestic &amp; wild animals &amp; their semen should be prohibited to prevent introduction of the disease</p> <p>b- Imported semen should be from bulls free from infection &amp; without clinical signs for at least <b>28 days post collection</b></p> <p>c- Imported animals should be put in quarantine for <b>28 days</b></p> <p>2- <b>In enzootically infected countries:</b></p> <p>a- Suspected diseased cattle should be isolated in insect proof buildings &amp; in contact animals should be vaccinated</p> <p>b- Hygienic disposal of carcasses &amp; hides by burial or burning to prevent spread of disease</p> <p>c- Spraying of animals, houses &amp; premises with effective insecticides &amp; disinfectant as: <b>2% NaOH</b></p> | <p>1- Infected lactating animals should be isolated &amp; must have separate attendants</p> <p>2- Milk is <b>not</b> fit for human consumption</p> <p>3- Udder, clothes, milking machines &amp; hands should be disinfected after contact with infected animals</p> <p>4- Teats should be dipped in suitable disinfectant as: <b>QAC</b></p> <p>5- Symptomatic treatment measures should be applied to control mastitis</p> |



|                                        |                                                                                                                                                                                                                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |  |
|----------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
| <p><b>Prevention &amp; Control</b></p> | <p><b>Vaccine Program:</b></p> <ul style="list-style-type: none"> <li>• <u>Type:</u> Live attenuated</li> <li>• <u>Route:</u> S/C</li> <li>• <u>Age:</u> at 6 months of age</li> <li>• <u>Booster dose:</u> After 6 months</li> </ul> | <p>d- Vaccination of all cattle over 6 months that gives protection for 3 years after vaccination</p> <ul style="list-style-type: none"> <li>• <u>N.B/</u> 50% of vaccinated cattle show local post-vaccinal reaction which disappear without complications</li> </ul> <p><b>Vaccine Programs:</b></p> <ul style="list-style-type: none"> <li>- <u>Sheep Pox V.:</u></li> <li>• <u>Name:</u> Sheep Pox V.</li> <li>• <u>Dose:</u> 0.5 ml</li> <li>• <u>Booster dose:</u> After 3 years</li> <li>• <u>Type:</u> Live attenuated</li> <li>• <u>Route:</u> I/D in tail fold</li> <li>• <u>Age:</u> Calves that are over 6 month of age</li> </ul> |  |
|----------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|

| Items               | LSD                                   | PSLD                                     |
|---------------------|---------------------------------------|------------------------------------------|
| Cause               | Neethling Pox V.                      | Allerton Herpes V. "BHV-2"               |
| Severity of disease | Severely acute                        | Less acute                               |
| Nodules             | Involving all layers of skin & S/C    | Superficial layer of skin                |
| Scar Formation      | Ulcers heel with scar formation (+ve) | Ulcers heel without scar formation (-ve) |
| Site of nodule      | All over the body                     | At hairless area as: udder & teat        |
| Histopathology      | ICIB                                  | INIIB                                    |
| Course              | 5 - 7 wks. "Long"                     | Short                                    |

| FMD                 |                                                                | BEF                                  |
|---------------------|----------------------------------------------------------------|--------------------------------------|
| Items               |                                                                | • BEF V. "RNA V." → F. Rhabdoviridae |
| Cause               | • RNA V. → G. Aphtho virus → F. Picornaviridae                 | - 4 [Cross reaction]                 |
| Serotype            | - 7 [Antigenically different]                                  | - Cattle & may be buffalo            |
| Host                | - Cattle, buffalo, sheep & goat                                | - 6 – 24 months                      |
| Susceptible age     | - All age & more dangerous in calves [High fatality]           | - Via insects                        |
| Transmission        | - Air-borne                                                    | - Summer season                      |
| Seasonal occurrence | - At any season                                                | - Salivation without stomatitis      |
| Signs               | - Salivation with stomatitis<br>- Fever with vesicle formation | - Fever without vesicle formation    |
| Lameness            | - Occurs with claw lesions                                     | - Occurs without claw lesions        |
| Sequel              | - Sudden death [Tiger heart]                                   | - Pulmonary emphysema                |

| MCF                 |                                                                                                           | RP                                                                                                                   |
|---------------------|-----------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------|
| Items               |                                                                                                           |                                                                                                                      |
| Cause               | • DNA V. → F. Herpesviridae                                                                               | • RNA V. → F. Paramyxoviridae                                                                                        |
| Serotype            |                                                                                                           | - All serotypes are antigenically similar                                                                            |
| Host                | - Cattle, buffalo & deer                                                                                  | - 1ry → Cattle & buffalo      - 2ndry → Sheep, goat & Swine                                                          |
| Susceptible age     | - Old ages [4 years or more]                                                                              | - All ages                                                                                                           |
| Transmission        | - Via contact of sheep or wildebeest                                                                      | - Via direct & indirect contact with diseased animal or material                                                     |
| Seasonal occurrence |                                                                                                           | - At any season                                                                                                      |
| Signs               | - Enlargement of Ln. with diarrhoea & erosion in mouth<br>- Purulent nasal discharge with corneal opacity | - Pinpoint foci on m.m of mouth & nose with fever<br>- Dark fluid feces with shreds of epithelium & streaks of blood |
| Nervous signs       | - Occur                                                                                                   | - No nervous signs                                                                                                   |
| Sequel              | - Death of animal [High CFR]                                                                              | - Destruction of B & T lymphocytes except memory cells<br>- Presence of zebra stripping      - Immunosuppression     |



| BVD                 |                                                                                                         | IBR                                                                                                      |
|---------------------|---------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------|
| Items               |                                                                                                         | •BHV-1 "Bovine Herpes V. 1" → F. Herpesviridae                                                           |
| Cause               | •RNA V. → F. Togaviridae                                                                                | - No antigenic relationship [ <i>BHV-2</i> → <i>Allerton's disease</i> ]                                 |
| Serotype            | - 2 biotypes (Cytopathic & non-cytopathic)<br>- 2 Genotypes (1 & 2)                                     | - Cattle & buffalo                                                                                       |
| Host                | - Cattle & buffalo                                                                                      | - Any age but calves those are less than 2 wks. have high fatality                                       |
| Susceptible age     | - 6 – 24 months                                                                                         | - Via inhalation, vertical or venereal                                                                   |
| Transmission        | - Via contact of diseased animals [ <i>Horizontal &amp; Vertical</i> ]                                  | - Winter season                                                                                          |
| Seasonal occurrence | - At any season                                                                                         | - Respiratory [Red nose] – Diarrhea with oral lesions –<br>Ocular – Nervous – Genital in males & females |
| Signs               | - Offensive odor diarrhea with blood & mucous<br>- Erosion & ulcers in oral cavity with corneal opacity | - Occur primary                                                                                          |
| Respiratory signs   | - Secondary due to immune-suppression                                                                   | - Delayed abortion at 5 <sup>th</sup> – 9 <sup>th</sup> month – Retained placenta                        |
| Sequel              | - Immunosuppression with 2ndry infection by IBR & HS                                                    |                                                                                                          |

| LSD                 |                                                                              | CBP                                                                |                                |
|---------------------|------------------------------------------------------------------------------|--------------------------------------------------------------------|--------------------------------|
| Items               |                                                                              | •CBP V. "DNA V." → G. Orthopox V. → F. Poxviridae                  |                                |
| Cause               | •Neethling V. → G. Capripox V. → F. Poxviridae                               | - No serotype difference                                           |                                |
| Serotype            |                                                                              | - Human, Cattle & buffalo                                          |                                |
| Host                | - Cattle only                                                                | - All ages but young ages are more susceptible                     |                                |
| Susceptible age     |                                                                              | - Via contact with infected milker or animal [ <i>Contagious</i> ] |                                |
| Transmission        | - Via insects                                                                | - At any season                                                    |                                |
| Seasonal occurrence | - At Summer season                                                           | - Macule, papule, vesicle, pustule, ulcer & Scab                   |                                |
| Signs               | - Presence of nodules on skin with edema & Enlarged Ln.                      | - Present in suckling calves from infected mother                  |                                |
| Oral lesions        | - Present with salivation                                                    | - Not present                                                      |                                |
| Lameness            | - Present                                                                    | - Thickening of teat                                               | - Deep ulceration without scab |
| Complications       | - Anestrus in female & infertility in male for 6 months<br>- Fatal pneumonia | - Stenosis of milk duct                                            | - Mastitis                     |

| Items               | EBL                                      | CBP                                                           |
|---------------------|------------------------------------------|---------------------------------------------------------------|
| Cause               | •BLV → F. Retroviridae                   | 1- Akabane V. → F. Bunyavirida<br>2- Aino V. → F. Bunyavirida |
| Serotype            | - No serotype difference                 |                                                               |
| Host                | - Cattle, buffalo & Sheep                | - Cattle, ewe & goat                                          |
| Susceptible age     | - Occurs at old ages [3 – 8 year]        | - Affect dams of all ages [All neonates]                      |
| Transmission        | - Via blood [Vertically or horizontally] | - Via insects                                                 |
| Seasonal occurrence | - At any season                          | - At Summer season                                            |
| Signs               | - Many signs according to site of tumor  | - Arthrogryposis, hydro-encephaly & abortion                  |
| Oral lesions        | - Not present                            |                                                               |
| Lameness            | - Not present                            |                                                               |